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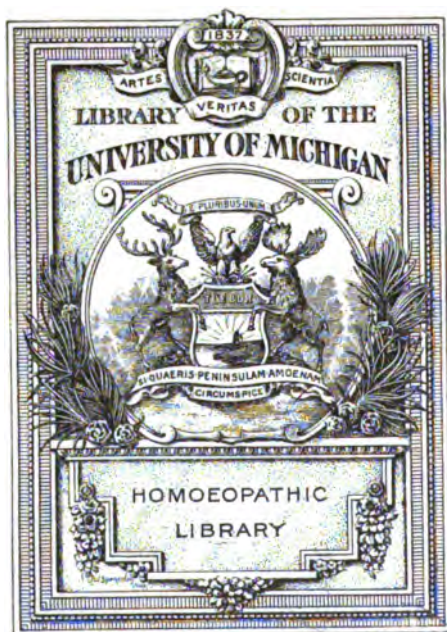
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HYDROTHERAPY

Cloth & go

HYDROTHERAPY

A BRIEF SUMMARY OF THE PRACTICAL VALUE
OF WATER IN DISEASE

FOR

STUDENTS AND PRACTICIANS OF MEDICINE

BY

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THIS VOLUME
IS DEDICATED TO MY FATHER

Frederick Dieffenbach

TO WHOSE ENTHUSIASTIC ADVOCACY OF HYDROTHERAPY

I OWE MY STUDIES ON THIS SUBJECT

AND TO WHOSE ZEAL IN ASSISTING ME

IN THE PREPARATION OF THESE NOTES

THE EARLY PUBLICATION IS MAINLY DUE

THE AUTHOR

PREFACE

THIS volume is the outgrowth of a course of yearly lectures which have been re-written, revised and added to from time to time during the past seven years, and its publication is due to the demand of students and practitioners of medicine for a small though complete volume on Hydrotherapy.

The volume will fulfill its mission if it teaches in a fairly comprehensive way what *hydrotherapy* means and accomplishes, and succeeds in enrolling its readers into the growing fraternity of physical therapists through bringing this subject before them in a concise, clear-cut manner. The writer desires at this point to acknowledge his great indebtedness to the late *Dr. J. G. Kuhn*, of Hudson County, N. J., with whom he spent the summer of 1897 in the study of this subject and whose influence has been potent in molding the author's conceptions on this therapeutic measure. *Doctor Kuhn* practiced hydrotherapy for *over fifty years*, and his tempered experience has been accepted and adopted by the author in many of the therapeutic recommendations. The writer also desires to express his thanks to the *J. L. Mott Iron Works* for the loan of numerous electrotypes illustrating hydrotherapeutic apparatus and to *Mr. H. L. Steidel* for his assistance in the preparation of photographs.

WM. H. DIEFFENBACH.

NEW YORK CITY.

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HYDROTHERAPY

HYDROTHERAPY

DEFINITION

This term signifies the curing of disease through the medium of water. The popular conception that *cold* water alone is applied is erroneous, as hydrotherapy as employed to-day makes use of all forms of water and all temperatures of water, from the application of ice to the use of steam. The various gradations of temperature indicated in different conditions and the consequent intimate association of thermotherapy with hydrotherapy compels consideration of the former in relation with hydrotherapy.

HISTORY

The use of water as a remedial agent is as old as mankind itself. We find mention of ablutions, bathing and compresses in all records of former civilization and the great religions all take note of its virtues. Thus Confucius, Moses, the Apostles and Mohammed advocate and appreciate water as a beverage and ablution, and the precepts of some religions have distinctly encouraged hydrotherapy as a prophylactic against disease. While in ancient times the lack of clothing and consequent air baths contributed to a strong and vigorous race, we nevertheless find records that the leaders of former civilization indulged in ablution and bathing for purposes of hardening the body and stimulating metabolism. Thus we read of the Spartans bathing their children at all seasons of the year in the Eurotas River, and the subsequent Roman civilization carrying baths and bathing to a magnificence not surpassed at the present day. The ruins of ancient baths with the various departments for thermo- and hydrotherapy give mute evidence of former appre-

ciation and popularity. In recent times the Englishman and his proverbial tub and the Japanese with their hot baths evince instinctive appreciation of the agency of water for hygienic purposes in various quarters of the globe. The father of medicine, *Hippocrates*, employed hydrotherapy in his practice, advocating affusions and ablutions, and especially recommending cold baths in fevers. *Asclepiades*, *Galen* and *Celsus* were strong advocates of the use of water in disease, and *Pliny* records the cure of the Emperor Augustus and the poet Horace of supposedly fatal disease by the use of baths recommended by the physician *Musa*. With the downfall of Rome hydrotherapy also became forgotten, and the Middle Ages record but few instances of its appreciation.

Until within recent times no efforts were made to revive the use of baths for therapeutic purposes, although isolated physicians, notably *Currie* and the *Hahns*, in the past century strongly urged medical adoption of hydrotherapeutic measures. It remained for a Silesian peasant, *Vincenz Priessnitz* (1829) to resuscitate the genius of hydrotherapy from its quiescence of centuries. *Priessnitz*, possibly through the writings of the neighboring physician, *Hahn* (1714), but certainly by experiments on himself and in veterinary practice, became a strong believer in the efficacy of water in disease. His success was so pronounced as to invite investigation by the Austrian government, which proved favorable, and the water cure which he established became the Mecca for European invalids, and some of his practical applications survive to-day. Unfortunately, *Priessnitz* did not write a single line on his conceptions of the principles of application, so that his wonderful success did not at that time find much repetition.*

Many physicians were induced to visit the Graefenberg and study *Priessnitz's* method of treatment, and the leaven thus given undoubtedly furnished the impetus for the subsequent scientific development of modern hydrotherapeutics. In view of present knowledge it will be interesting to briefly quote from

* *Priessnitz's* son-in-law, Hans Ripper, has recently published his reminiscences which give some information on *Priessnitz's* technic.—Ripper, *Fünfzig Jahre Graefenberger Erinnerungen*. Leipzig, Krüger & Co.

a letter written by *Professor Mundé*, who visited *Priessnitz*, and was cured of a chronic ailment: "*Priessnitz* contends that all diseases which are not occasioned by accidents, arise from vicious humors which he calls bad juices; from these result either general derangement of the system or disorder of some of the organs. Consequently, the object of his curative method is to expel the bad juices and replace them by good. The means which *Priessnitz* employs to attain this end are water, air, exercise and diet. Is he right in looking for the diseases, or at least, their causes, in the humors? This is a question which I do not pretend to decide; but if we judge by the success which attends his method, when followed up with constancy, we should say he must be right; for, generally speaking, with the aid of the above four means he cures all diseases which professional men acknowledge to be within the realm of drugs; nay, more, this view of things agrees with the opinion of some of the most celebrated doctors of the last century to whose practice *Priessnitz's* treatment bears a great resemblance."

The following extract from a letter by *Doctor Engel* (Vienna, 1840), may also be of interest at this point in describing *Priessnitz's* technic:

"The invalid is awakened at four or five o'clock in the morning, then enveloped almost hermetically in a thick, coarse, woolen blanket; the head only is left uncovered, by which all contact with the exterior air is carefully avoided. Presently the heat accumulates round the invalid, depending upon the heat of the atmosphere, and he perspires sufficiently to wet the whole of the coverings; during this time he may drink as much cold water as he pleases. After he has thus sweated the allotted time, he takes a cold bath. The first impression is doubtless disagreeable, but once overcome, an agreeable sensation follows, as the pores, dilated by the heat, absorb the liquid.

After much observation, this is found to be the moment when that salutary exchange takes place which purifies the system (re-action). This sudden variation of temperature has never produced any serious accident; all irritation produced by stimulants is carefully avoided; the lungs are not heated by breathing hot air as in the Russian baths, the skin only being slightly stimulated. On coming out of the bath the invalid is dried and quickly

dressed; if able, he then takes a walk, during which he drinks abundantly of cold water. He ought, however, to avoid excess, which is manifested by a disagreeable weight at the stomach. Habit does wonders in this respect; one sees persons almost hydrophobic at the commencement, who, after a time, drink from twenty to thirty glasses of water a day.

Breakfast consists of bread, cold milk and fruit. *Priessnitz* considers all heated things to be prejudicial and debilitating to the stomach, and this opinion is confirmed by his experiments upon animals. After breakfast every one is expected to take a long walk, and then proceed to the douche, leaving a sufficient interval to avoid accidents.

Invalids whose skins are habitually cold, dry and hard will perspire more easily from cold ablutions; those who suffer from local complaints are relieved by more or less frequent fomentations; those who are attacked by chronic evils which are more obstinate are submitted to the influence of cold water.

I have already made mention of the douche; it is very interesting to observe the efficacy of this last manner of applying cold water. A gouty subject, for instance, who submits his hands and feet or any swollen part, to the action of a strong fall of water experiences the following phenomenon: his skin becomes red and he then feels an intolerable itching, occasioned either by reabsorption or oftener by a topical suppuration.

Invalids should generally drink much cold water and take a great deal of exercise if they can support fatigue. The dinner hour is one o'clock. I think it would be difficult to see a more extraordinary appetite than that possessed by *Priessnitz's* invalids, who all dine in the same room.

Invalids afflicted by chronic diseases, whose digestion has been deranged by a number of remedies, are not long before they re-establish its functions by the return of their vital force.

The food is plain and abundant; the only objection to it is that the dishes are sometimes too coarse for delicate stomachs. Each person eats as much as he pleases or according to his appetite.

If the weakness of the patients or the crisis already begun does not prevent it, they recommence some hours after dinner the treatment of the morning; the douche is, however, forbidden, as too irritating. After a slight supper of cold milk and bread, every one retires to rest. The occupations of the day are a guarantee for repose during the night.

The sensation caused by the hydropathic treatment differs essentially from that arising from any other method of cure. In the beginning, the return of strength and the awaking of the torpid faculties are agreeably felt; excitement is not limited to the affected organs, but becomes general and produces a salutary revolution in all the vital powers.

The true febrile symptoms develop themselves; the pains already existing become more intense; old diseases, in appearance cured long since, reappear; these effects being but the forerunners of a more determined crisis.

Almost all the patients who have followed this treatment for some time, feel an itching and a sharp pain in the skin, which is sometimes covered with spots or pimples of different forms.

The diseases which are caused by the irregularity of the nervous functions are generally limited to this sort of crisis. If we, on the contrary, treat of the cure of what are called general diseases, the phenomena which they manifest are sufficient to convince the most incredulous of the efficacy of this treatment. The sweating, more abundant every day, contains morbid matter, the nature of which differs according to the disease. The different shades of viscosity and of the odors prove this most incontestably. The number of abscesses which make their appearance sooner or later under the influence of cold water, purify the system of corrupt humors. Whilst the invalids are thus covered with abscesses, an abundant secretion is discharged by perspiration, the urine or urethra. They then find themselves physically and morally better, their appetite increases, their pains are diminished and finally their health is established." Thus *Doctor Engel*.—

The positive results secured by *Priessnitz* induced physicians of standing, including *Oertel* and *Brand*, to introduce hydrotherapy into medical practice. It also led to the establishment of numerous water-cure establishments, the proprietors of which had more or less conception of the value of hydrotherapy. Exorbitant claims of enthusiasts like *Rausse* and *Hahn* tended to discredit the system with conservative physicians, and the treatment as a whole threatened to again become innocuous among the profession had it not been for the indefatigable labors of *Wilhelm Winternitz*, of Vienna, who has justly been termed the father of modern Hydrotherapy.

Winternitz had visited the Graefenberg as a young man and become imbued with the absolute value of hydrotherapy. His life since his graduation as a physician has been devoted to the scientific testing and application of water in disease, and his excellent treatises and those of his scholars (*Strasser, Pick, Buxbaum, Loewy*) have placed hydrotherapy on a pedestal with a sound foundation of physiological facts. Coincident with *Winternitz*, the incontestable success of *Brand* in the treatment of typhoid fever compelled recognition by even the most myopic drug prescriber, and the truth of ages has at last become medical property in many countries.

The great obstacle to the diffusion of hydrotherapeutic knowledge in circles where it was most needed has been the neglect of medical universities and colleges to place this subject upon the curriculum. Prominent universities in Europe, notably Vienna, Berlin and Heidelberg, have excellent instruction and clinics on this subject, and many textbooks now furnish the pabulum for hydrotherapeutic study. In the United States it is noteworthy that the New York Homœopathic Medical College, under the leadership of *Dean King*, was the first to place hydrotherapy upon the curriculum, 1902, as a regular course for didactic and clinical study, to be followed in short order by many other colleges. It is gratifying to record that since 1907 the New York College of Physicians and Surgeons has also taken up this step-child of medical practice and has appointed the veteran *Dr. Simon Baruch* to a professorship in this department of medicine. With the general adoption of this study in all medical colleges, the time is not far distant when hydrotherapy will receive its full due and be in general use among all physicians, to the material elevation of the medical standards of success and the great benefit of suffering mankind.

CHAPTER I

CHEMICAL AND PHYSICAL PROPERTIES OF WATER

We will first give a brief review of the *chemical* and *physical properties of water*.

Water— H_2O , the mon-oxide of hydrogen, exists in nature in three forms—solid (ice), liquid (water proper), gaseous (steam). At all temperatures between 32° – 212° F. water remains liquid (under ordinary atmospheric pressure); above 212° F. it assumes the gaseous form. At 32° F. and below, freezing takes place. In passing from solid to liquid state water is reduced in volume, and on freezing sudden expansion takes place; this expansion often splits rocks and breaks iron beams. Water is the most general and the greatest solvent of chemical substances known, nearly all the salts being dissolved in it to a greater or lesser degree. Gases will dissolve in water very readily, and it is the oxygen derived from the air dissolved in the water of oceans, lakes and rivers which permits the fish to breathe; for the water in passing through their gills gives off its oxygen and permits purification of the blood. Similarly when bathing the body, *the skin is brought in contact with oxygen* and absorbs same to a certain extent. The impurities are oxydized, the water also acting as a solvent for the removal of débris. This is an important physical fact which should be borne in mind.

Water is an essential constituent of all tissues of the body, forming about seventy per cent. of the entire body weight. Thus a man weighing one hundred and fifty pounds consists of 105 pounds of H_2O . It must be apparent that a substance constituting so large a percentage of the human frame must perforce be of great importance in the metabolism and well-being of the organism. Water is introduced into the body in the form of drink and as part of all kinds of food. The average

quantity consumed daily is 2 quarts or 64 ounces. In the body, water acts as a general solvent, giving pliability to the various tissues and assisting in the passage of organic and inorganic matters through animal membranes. It also promotes chemical changes which are essential for the absorption and assimilation of food and assists in the elimination of waste material. It is believed that water is formed in the body *de novo* by the union of oxygen and surplus hydrogen from the food. Water is eliminated by the emunctories—the skin, the lungs, intestines and kidneys.

All secretions of the body contain from 90–95% of water; thus the gastric juice, bile, succus entericus; lymph consists of 96.54% water, chyle 90.24%, blood plasma 90.20%. Water acts as a solvent for the inorganic matter and holds the blood corpuscles in suspension. When the body suffers from lack of water, externally and internally, the secretions are impaired and derangement of function follows such impairment, with supervening ailment and disease. Water is able to absorb and transmit heat or cold, and its great flexibility permits of many gradations of intensity. In addition to these temperature changes, the effects of the force of impact and the duration of treatment are of importance in affecting the status of a case.

CHAPTER II

PHYSIOLOGICAL EFFECTS OF WATER ON THE ECONOMY

There are four general methods of action of water on the economy—the *thermic*, *solvent*, *absorbent* and *mechanical*. Through these agencies water acts *directly* upon the mucous membranes and skin and *reflexly* upon the circulating system, the nervous system and the viscera. *Professor Winternitz* deserves the credit for inaugurating elaborate tests upon healthy human beings to determine the action of water on the skin, the circulation, the nervous system, the secretions, respiration and temperature and also upon metabolism in general.

These epoch-making tests permit us to apply various treatments with precision on a physiological basis and to predicate certain results which former empiricism rendered dubious or uncertain, to say the least.

In order to properly appreciate the action of water on the outer covering of the body through which it is most frequently applied, it will be profitable to briefly review, the physiology of this important, but oft-neglected organ of the body.

THE SKIN

The skin has many functions.

1. It acts as a protective covering for deeper tissues.
2. It contains nerve filaments of the sense of touch, temperature, sense and other nerve endings the functions of which are not definitely known.
3. It acts as an organ of excretion and secretion.
4. It has the power of absorbing gases, liquids, medicines and even minute particles of matter.
5. It assists in regulating the temperature of the body.

The most important appendages of the skin are the peripheral nerves and the sweat or sudoriparous glands. The importance of the sweat glands will be recalled when we remember that there are as many as from 1000-1500 of these glands contained in one square inch of skin, all performing separately their functions. It has been estimated that there are approximately two million of these glands on the skin surface, which when placed end to end would furnish a tube two and one-half miles long.* The sweat glands extract from the abundant plexuses of capillaries surrounding their base the excrementitious substance called sweat or perspiration. This is usually acid in reaction with a specific gravity of 1004-1005. The amount of perspiration excreted daily is from 1½-2 pounds, depending on the temperature, exercise, food and drink. The sweat is poured out continuously; under ordinary circumstances it is evaporated as fast as formed (insensible perspiration); when the amount increases through reflex stimulation, heat or exercise, the sweat forms in drops and can readily be seen (sensible perspiration). It will be noted that when perspiration is copious, the urine diminishes in volume, the two excretions bearing a fixed relationship in health.

Sweat consists of over 99 parts of water and less than one part of solids. The latter consists of urea, indol, phenol, sulphoethers, carbonic acid, sodium chloride, fatty compounds and organic acids. These solids represent excrementitious matters removed from the blood and can be increased to a large total by stimulating the sweat glands through hydrothermic procedures. Perspiration also regulates the temperature to a certain degree, and whenever perspiration is deficient or checked, grave symptoms of toxemia are induced and death has occurred from cessation of this function. *The sweat is also able to excrete micro-organisms.* Sweating is regulated by the nervous system. The vaso-motor nerves regulate the blood supply, the secretory nerves stimulating the activity of the glandular structures. The sweat center is located in the medulla, but subordinate centers are also present in the spinal cord. The secretory fibers

*This illustration is given to impress the vast importance of these organs upon the student.

reach the sweat glands of the head and face through the cervical sympathetic, of the arms through the thoracic sympathetic, the ulnar and radial nerves and of the legs through the abdominal sympathetic and the sciatic and crural nerves.

The character of the perspiration changes in many diseases and in kidney diseases especially, its urinous odor is readily appreciated. In all diseases accompanied by auto-intoxication, the trained hydrotherapist is able to influence the excretion through the skin of toxins (indol, phenol, skatol, etc.), and thus relieve the system of disease. The importance of being able to influence one of the important emunctories such as the skin, to do inestimable work in elimination, thus relieving others such as the kidneys, the lungs, the liver and its associated intestines of extra work when the latter organs are diseased, can hardly be appreciated. We note the importance of the skin as an emunctory most profoundly when its function is impaired, such as in scarlet fever, when the extra elimination in many cases produces severe inflammatory lesions of the kidney. It must be patent to all observers that if we can influence this organ and control its eliminating powers, we have a powerful means of combating disease. The application of various hydrothermo-applications furnish such an aid. While emphasizing the value of the sweat glands in disease, it must not be forgotten that besides its excretory agents the skin has a mesh of peripheral nerves, whose functions while incompletely determined nevertheless are of great importance, as *the whole nervous system may be stimulated or depressed* directly through the local action and also reflexly, by suitable applications of water at stated temperatures.

The action of cold and heat is conveyed to the sensorium by two distinct sets of nerves; lowering of the temperature of the skin is due to irritation of the nerves conveying the sensation of cold, while increase in the temperature of the skin follows stimulation of the nerves conveying the sensation of heat. Irritation of the nerves conveying the sense of temperature is dependent on:

1. The temperature of the water. Irritation is intensified according to the increase above or below the *indifferent zone of*

temperature. This indifferent zone has been variously estimated from 92°-97° F. and is thus termed as the healthy body when immersed at these temperatures shows little or no physiological change. As we go above or below these stated temperatures, changes in sensation, metabolism and function occur, increasing in their activity up to a certain point. When the distance from these indifferent temperature limits is excessive, paralysis of the peripheral nerves and local circulation supervenes and the sweat gland function is inhibited.

2. Increase of irritability varies according to the affected areas. The effect is greater upon large surfaces, smaller upon small surfaces.

3. Irritability also depends on the sensitiveness of the parts irritated, as different portions of the body reaction differently (soles of the feet, etc.), and there are individuals who exhibit idiosyncrasies in this respect.

4. Irritability is increased up to a certain degree if irritation is prolonged.

5. Irritability can be modified by the addition of mechanical or chemical irritants.

The action of hydro and thermotherapeutic measures upon the nerves and sweat glands of the skin constitute the principal measures for affecting the economy, although of late the action of these measures upon the mucous membranes has received increased attention. The skin is able to absorb fluids to a small degree, the absorbing ability of the mucous membranes, however, is very great. This leads us naturally to a discussion of the *internal administration* of water by imbibition, hypodermoclysis, retention enemata and irrigation.

ACTION OF THE INTERNAL ADMINISTRATION OF WATER ON THE ECONOMY

As a rule, not sufficient water in its pure state is imbibed by the human race. Many foods and beverages, however, are almost wholly composed of water,* and the compound is in this way received into the system, so that persons who habitually neglect the drinking of water *per se* do not suffer from this neglect as much as would be expected.

Water is added to the economy principally through imbibition by the mouth, and is absorbed by the mucous membranes of the small intestines. It can also be largely absorbed through the intervention of retention enemata by the large intestines or by hypodermoclysis.

Water thus ingested remains in the body for a varying period of time, the temperature of the water and that of the body seeking equilibrium according to the laws of physics. Thus cold water will, to a certain degree, remove heat from tissues, hot water add temperature to same, the degree of heat or cold and the length of time and size of area affected regulating the thermal exchange.

Water is soon absorbed and reaches the circulation, the fluidity of which is acted upon; the quality of the blood is also acted upon, thus directly influencing all the organs and tissues supplied by the circulating medium. Water conveys the fluid particles of food to the blood and is also the vehicle of transportation for excretions and secretions. The permeability and elasticity of tissues also depend on the relative amount of water in the circulation.

Drinking of cold water increases blood pressure and lessens the frequency of the pulse and slows the heart and improves its quality; hot-water drinking increases the contraction of the heart and the blood pressure, while tepid water diminishes same. The colder the water imbibed the fewer the contractions and the less the blood pressure; the hotter the water the more frequent the contractions and the greater the blood pressure. Cold-

* Most vegetables and fruits contain from 95-98% of water.

water drinking also reflexly deepens and increases the respiratory act.

When large quantities of water are ingested the blood pressure is markedly increased and the action of the emunctories, the lungs, skin, salivary glands, intestines and kidneys, is distinctly stimulated.

The amount of urine is increased through water drinking, the sweat glands become more active and the intestines are stimulated also. End-products of metabolism are excreted through the emunctories in increased amounts. The percentage of urea and phosphates show relative increases in the urine, and uric acid and oxalate of lime are more rapidly eliminated. It is claimed that as oxydation is favored by the ingestion of water, that uric acid, kreatinin, xanthin, oxalic acid and other products of sub-oxydation are diminished and the lesions dependent upon same are relieved.

The solvent action of water upon toxines in the blood and viscera cannot be too strongly emphasized. Catabolic waste materials are diluted and thus more readily eliminated and auto-intoxication and stasis relieved or obviated.

Cold-water drinking does not produce perspiration; this is best induced by drinking moderately hot or hot water; by adding a little lemon juice the taste of the water is improved and it is more readily taken.

Wernitz (*Therapeutische Monatshefte* No. 2, 1903) called attention to the value of colon flushing and the use of retention enemata in infectious diseases, the technic of which will be given later on. The principle of the treatment consists in the addition to the circulation of the largest possible volume of fluid for the purpose of obviating the diminution of water in the economy noted in all fevers with the accompanying symptoms—dry lips, dry throat, dry, hot skin and oftentimes thirst—and also in order to assist in the elimination of all the excretions so that toxines of all kinds are more readily thrown off. The dilution of the poisons through increased fluidity of the blood and the increased elimination of all secretions assists the organism in its battle with toxines and pathogenic micro-organisms; the deleterious action of the poisons are lessened and the body gets

a chance to fortify itself by forming anti-toxins. As the drinking of liquids in large amounts is not well tolerated, the large intestines have been utilized and the absorption of fluids through this medium by means of retention enemata has been very successfully employed. Absorption of water or normal salt solution by the large intestines takes place rapidly, causing the pulse to become fuller, the dry mucous membranes to become moist, with supervening perspiration whenever the process has been carried on to some extent. The temperature is lowered during the secretion of the sweat, and if the process is continued soon becomes permanently reduced. The amount of urine is often increased to five or six quarts a day when this measure is regularly applied, and no untoward results have been noted. The mucous membranes will absorb large quantities of fluid but never more than the economy can take care of, as the surplus is excreted by the urine and sweat. The heart is not embarrassed as occurs from excess of hypodermoclysis or transfusion, and the process is safer in every way than the above methods.

On the digestive function experiments on animals have shown that drinking of fluids *with meals*, reduced the amount of hydrochloric acid in the gastric juice. The drinking of cold water *before* meals stimulates gastric secretion, hot water diminishes same. Cases of hyperchlorhydria are therefore improved through *hot* fluids, hypochlorhydria demands stimulation with cold drinks.

The temperature of the alimentary canal can be affected by cold- and hot-water drinking, and through it also the general temperature of the body. The stimulation of the vasomotor nerves by cold water also increases secretion and peristalsis. The amount of bile can be increased and fecal discharges augmented through the drinking of cold fluids between meals.

Some observers state that hot fluids tend to *increase* the *excretion of bile* to a larger degree than does cold.

Carbonated waters stimulate peristalsis and also increase the secretions of the healthy gastric mucous membrane. These waters are also diuretic to a marked degree, this physiological action being due to increase of the blood pressure following inhibition of same.

ACTION OF HYDROTHERAPEUTIC PROCEDURES ON THE HEART AND BLOOD-VESSELS

1. Cold water primarily contracts the cutaneous vessels, capillaries, veins and arterioles and thus produces an anemia of the skin. This is followed by hyperemia if the irritation is kept up or upon cessation of same. Hyperemia is due to irritation of the vaso-dilators or through over irritation causing paralysis of the vaso-constrictors. In the latter case loss of the tonicity of the blood-vessel is noted. The thermal irritation is conducted by the peripheral nerves to the center and reflexly returned via the motor areas.

Winternitz regards vascular dilatation occurring as a result of the action of low temperatures and of moderate mechanical irritation as an *active* process, perhaps due to the influence on the inhibitory nerves. The vascular dilatation occurring from the action of *heat* he attributes to *passive* relaxation, possibly paralytic in origin. Vessels dilated as a result of heat are flaccid and have loss of tension, while the vessels dilated under the influence of cold exhibit tonic resistance and an increase of tension of their walls. Experiments made with the tonometer show distinct increase in blood pressure after *cold* applications, while *heat* shows opposite effects with lowering of the pressure. *We thus distinguish between active and passive congestion or hyperemia. The former is due to direct excitation or reflex irritation of the inhibitory nerves with increased flow of blood. Passive congestion is due to paralysis of the vaso-constrictors—producing an atonic hyperemia.*

2. Hot applications produce a momentary contraction of blood-vessels followed by prompt dilatation of same. In this instance, however, we have a lowering of the tonicity of the blood-vessels with diminished pressure. The effect, therefore, of cold- and hot-water-applications, while apparently similar (contraction followed by dilatation of blood-vessels) is vastly different. The influence of the cold causes a rapid influx of blood and increased tension of the vessels, while the heat produces relaxation and diminished blood pressure. The deeper

vessels may also be contracted and dilated through influence of thermic measures applied to the periphery. Dilatation, however, of these deep vessels can only be secured from extremes of temperature. Blood pressure being distinctly influenced by cold and heat, the cardiac action can also be put under control. Water of low temperature produces invigoration of the heart's action due to increased tonicity of the blood-vessels and increase of blood pressure; weakened action of the heart with lowering of tonicity and blood pressure results after application of high temperatures.

3. *Cold applications, if long continued*, as well as dermal irritants *if excessive*, produce *diminution of blood pressure* through their paralyzing effect upon the tonicity of the blood-vessels and heart.

4. Dilatation or contraction of blood-vessels never affects the whole circulation at the same time. On the contrary, when the capillary circulation is dilated the internal circulation, including that of the viscera, contracts to some extent. This important action is of vast importance for therapeutic purposes.

5. Experiments have also shown that innervation of the capillaries of the extremities is bilateral. Thus, if one hand is placed in cold water, the blood-vessels of the other hand contract also.

6. It has been demonstrated that viscera are somewhat independent of the general blood-supply through action of their separate sympathetic nervous system, and can be influenced *reflexly* only up to a certain point.

These facts permit the following deductions as to the influence of hydrotherapeutic measures upon the circulation:

1. Through local application of cold or heat we can act directly upon the blood-vessels at the point of treatment and also secure reflex action upon deeper vessels.

2. Reflexly and dynamically other regions of the body are influenced to a greater or lesser degree.

3. The skin can be rendered anemic or hyperemic and the underlying viscera influenced to some extent.

HEART AND PULSE

Through reflex action of cold applications upon the heart, the pulse rate can be increased, to be followed by a decrease, when the increased tension is diminished. Cold applications to the cervical spine also produce first acceleration later diminution of the frequency of the pulse.

Hot applications over the precordial area produce primarily a slowing with secondary acceleration of the pulse. Contractions of the heart muscle become more vigorous after cold applications and relaxed or weakened after hot applications. This is explained by the reflex action as already noted, causing increased tonicity in the case of cold, relaxation in the case of heat, and in addition also the secondary stimulating effect of the actual cooling of the body and the secondary depressing effect of the application of heat. The therapeutic value of cold applications to the heart with secondary slowing of its contractions consists in the prolongation of the diastole with coincident increase in the nutrition of the heart muscle. As *Professor Winternitz* points out: "It is the action of digitalis without its toxic and cumulative effects."

In addition to local and general applications of cold and heat, the internal administration of water through imbibition and injections or retention enemata exerts positive influences on the heart and blood-vessels. There is *increased* tension after the absorption of cold water, while hot water produces diminished tension with dicrotic pulse in many instances.

Cold-water drinking, while increasing blood pressure, slows the heart; very hot water increases the contractions of the heart and the blood pressure, while tepid water diminishes same. The colder the water the fewer the contractions, and the less the blood pressure; the hotter the water the more frequent the contractions and the greater the blood pressure. The larger the area placed under the action of cold or heat, the greater the relative effect. Thus, the effect of a cold, full bath of short duration on the circulatory tone far surpasses in action the simple application of a coil or compress over the precordial area.

General tonic (short, cold) applications over the whole surface of the body produces capillary hyperemia, and if the local irritation of the peripheral nerves is marked (*Nauheim* or sea baths) this capillary dilatation can be augmented to such extent that 60% of the blood supply can be temporarily drawn toward the periphery. Reflexly, this procedure rests the heart, as it has fewer blood-vessels to supply and its contractions become firmer and fewer. These physiological factors will be further elaborated in the chapter on Diseases of the Heart.

ACTION OF HYDROTHERAPY ON THE NERVOUS SYSTEM

The action on the nervous system of the various modalities included in hydrotherapeutic measures has lately received increased attention owing to the success attending such application in psychiatric practice. The action may be classified as constitutional and dynamic, also objective and suggestive.

As already noted, contact with water to the skin causes peripheral nerve irritation; different temperatures of water affecting the nerves in different manner. In addition to temperature variations, the mechanical force, the extent of the area treated and the duration of treatment variously influence the nervous system. The greater the respective temperatures from the indifferent zone, the greater the mechanical irritation and area treated, the greater the shock to the nervous system. These effects can be increased by alternating heat and cold (rarely cold, followed by heat). In sensitive persons small areas must be treated at first in order to accustom the system to the shock; thus cold sectional ablutions are prescribed to be followed in due course with the more vigorous full bath or douche.

Cold procedures produce stimulating or irritating effects on the nerves; hot applications a relaxing or soothing action.

Thus, if we desire a soothing or calming effect on the nervous system, and incidental stimulation is striven for, we will advocate the use of the warm bath followed by cold procedures. If the patient is very susceptible, the graduated bath is preferred, with the warm temperature gradually replaced by cooler water. Mechanical influences such as douches can also be regulated at

will—the greater and quicker the force, the more rapid the reaction and stimulation secured. A needle or rain bath, with high pressure, will exert an intense reaction upon the skin, while one of low pressure and indifferent temperature will show little or no change. Different areas of the body show various reactions. Thus, dorsal surfaces are less irritable than palmar. Some individuals also show peculiar idiosyncrasies toward cold or heat, and various portions of the body will show these peculiarities to temperature.

The action of intense cold (ice) and heat on peripheral nerves is inhibitive and analgesic; the sense of touch is diminished by cold, increased by heat. Both heat and cold are employed for analgesic effects, the former preferably for the accompanying relaxing effects (colic-neuritis, etc.), the latter in inflammatory states and sometimes for its accompanying primary contractile action (hemorrhoids, etc.).

Stimulation of the peripheral nerves, as well as inhibition of same, can be induced by either cold or heat and the momentous therapeutic effects resultant from increased individual and combined nerve-cell stimulation or inhibition secured. This increased or diminished nerve-cell activity carries with it changes in its nutrition. Stimulation or inhibition of the blood-vessels and tissues supplied by the nerve cells thus affected is coincident with the action on the nerve cells themselves, thus inducing an increase or diminution of nutrition or function either local or general, of the parts supplied.

These statements are of immense importance and, although general in scope, can be readily applied in practice.

The soothing or calming or relaxing effect of warm baths are of distinct value in psychiatry, the prolonged, warm baths being in special favor. The latter act largely suggestive, although no doubt the dermal excretion of toxins is markedly accelerated and the underlying cause of some cases removed through persistency in these measures.

The suggestive benefits of hydrotherapy have not been touched upon. Under properly conducted measures the patient feels and appreciates that something is being done to relieve his symptoms; he is kept busy and has no chance for introspection

—in hysterical, neurasthenic and psychasthenic cases a general set program of calming and alternately stimulating hydrotherapeutic procedures, keeping the patient busy most of the day, has, under careful supervision of reaction and results, done remarkable work, and there are few institutions where hydrotherapy shows more brilliant results than in those where mental and nervous cases of disease are thus capably treated.

The sensation of refreshing vigor imparted by a short, cold douche or plunge, due to the glow or reaction, carries with it suggestion of improvement rarely equaled by any other measure, excepting possibly the stimulating effects produced by conservative air baths.

ACTION OF HYDROTHERAPEUTIC MEASURES ON THE TEMPERATURE OF THE SKIN AND INTERNAL ORGANS

The temperature of the skin depends upon the circulation, whether slow or accelerated, and also on the surrounding medium. Varying in different persons, the temperature of water in which little or no sensation of either cold or heat is experienced, ranges from 92°–97° F. This has been called the Indifferent Zone; below or above this zone sensations of cold or heat are noted, and physiological changes take place. The temperature of the internal organs varies according to the temperature of the blood and the volume of blood circulating within them. Decrease of temperature of an organ is due to diminished supply of blood or to cooling of the organ or of the blood which flows to it.

Rise of temperature of an organ occurs through increased volume of the blood, through a direct heating of the organ itself or its supplying blood medium. Hyperemia is produced by the application of cold to the peripheral blood supply, but can also be induced by applying cold to the blood-vessels supplying the part. The veins can also be influenced in the same way; cold contracts peripheral veins, and the phenomenon of redness followed by lividness can be readily noted. The lividness is due to venous stasis. Having the blood supply under control in this manner, it is possible to increase or diminish the blood supply,

directly or indirectly, to single organs or parts of the body, and with it the temperature of same.

The permanent temperature of the body is affected but slightly by cold applications unless these are excessive, as the system is able to compensate the loss of heat very readily. This is accomplished by diminution of heat given off; if this proves insufficient the production of heat is increased by means of the disintegration of non-nitrogenous substances contained in the muscles.

Albumin is given off only when the chemical and physical regulation of the bodily heat proves insufficient after excessive abstraction of heat. Warm applications, as soon as they are able to confine the giving off of bodily heat, *increase* the bodily temperature—this increase is progressive, depending upon the length of time of the application and the degree of heat.

During the increase of bodily temperature, metabolism is increased of non-nitrogenous as well as nitrogenous principles.

Albumin is excreted in large amounts only when high temperatures are maintained for some time (an unusual procedure in hydrotherapy). Albumin is also thrown off through continued excessive cold applications. Carbo-hydrates are also excreted in distinctly increased amounts in both hot and cold applications, if excessive.

Short, tepid baths or applications given at the indifferent zone—92°–97° F.—appear to have no action on the temperature and the generation of heat. Irritants added to the water, such as carbonic acid gas, salt, or sulphur, assist in rendering physical resistance to cold temperatures less powerful; *i.e.*, a mild, cold bath with carbon dioxid added, has the approximate effect of a colder bath without it.

*Winternitz** sums up the action of cold and heat applications as follows:

1. Heat or cold can change the temperature of the periphery, if sufficiently prolonged, to approximately that of the applied medium.
2. Local cooling and heating do not change the *bodily temperature* to any extent, unless almost one-quarter of the surface of the body is treated.

* Hydrothermotherapie. 1906.

3. Local cooling and heating of a part can be secured to any depth desired, providing the effects are sufficiently prolonged and intense.

4. Cooling and heating after lowering and raising the temperature, take place more rapidly, depending on the differences of the media in which the person remains after the treatment.

5. The intensity and duration of the cooling and heating depend, in the former, on the promptness of the reaction; in the latter on the retardation of same.

6. Active and passive exercise increase the action of cold and heat more so than rest.

7. Individual circumstances, especially the nerve supply and circulation, are of great influence on reaction following thermic effects.

8. In the vicinity of the parts treated when loss of temperature is secured, there is an increase of temperature, while the increase of heat to a part cools off the surrounding tissues, showing a change in the distribution of blood supply of the parts.

Metabolism is increased in the parts heated, is lowered in the parts cooled.

Cold applications to inflammatory processes produce a slowing and a retardation of the process. The lowering of the temperature and the consequent slowing of the circulation diminish the exudation, and the number of pus corpuscles. Local warm application increases the number of corpuscles and the flow of blood.

Chemical change, fermentation and decay are retarded by cold, increased through heat.

The reflex action of heat and cold has also been studied. Thus, cold applied to the lower extremities increases the temperature of the spinal cord, while heat applied over the same area diminishes the temperature of the cord.

Cold applied to the lumbar region increases the temperature of the lower extremity, heat reversely lowers the temperature of the same portion of the anatomy. The practical application in therapeutics of these reflex actions are many. For instance, cold applications to the spine relieves habitual coldness of the lower extremities. These reflex applications will be further dilated upon in the chapters on therapeutics.

Hydrothermic Measures in Fever

In the therapeutic chapters, the action of heat and cold in fevers will be dilated upon. Cold, through stimulation of the peripheral nerves and reflexly the whole cerebro-spinal and sympathetic systems, acts as a true tonic, increases vital activity and through *increased elimination* chiefly lowers temperature. Contact of cold also tends to lower the general temperature of the body providing, as already pointed out, the cold is sufficiently *prolonged* and friction is employed to keep up peripheral flow of blood.

Heat lowers the temperature if applied for a *short period* through abstraction, and its main value in fever is in the elimination of toxines and effete material through the sweat glands. *By alternating heat and cold*, the former for its eliminative value, the latter for its tonic effect on the circulation and nerves, excellent results are obtained in inflammatory conditions and fevers.

Heat, if applied *excessively* or for *too long a period*, increases bodily temperature, as already pointed out in the former chapter.

ACTION OF HYDROTHERMO THERAPEUTIC PROCEDURES ON THE MUSCULAR SYSTEM

Cold applications, up to a certain point, act as a stimulant to muscles; heat produces relaxation of same. Heat combined with friction, massage, stroking and other active measures, also acts as a stimulant. The refreshing, stimulating effect of cold on the muscles is due to increased tonicity of the blood supply of same, with increased nutrition and increased elimination of carbon dioxid. Heat produces a relaxing effect through dilatation of the blood-vessels with flaccidity of same with consequent stasis. If active measures are added to the heat, the elimination of carbon dioxid is hastened, and in addition to the relaxation of the muscles, stimulation of nutrition can be also increased. Excessive cold and heat produces inhibition of muscular action, and is utilized therapeutically in certain chronic exhaustive diarrheas where prolonged cold sitz baths have

proven of much value in checking excessive peristalsis. The action of cold and hot applications upon the heart muscle has been treated in a previous chapter.

ACTION OF HYDROTHERMO THERAPEUTIC PROCEDURES ON THE SPINAL CORD

The studies on this interesting subject have not been completed, although *Chapman* and other pioneers have contributed valuable observations.

Chapman found that heat and cold applied to respective portions of the vertebral column could influence the circulation of the brain and spinal cord, and also affect the ganglia of the sympathetic system, and through them the various viscera. Ice applied on the spine, over the respective locations of the sympathetic ganglia supplying a special organ, can induce stimulation of said organ. Thus the application of ice to the cervical spine and the scapular region will increase the circulation of the brain and if continued, regulate the supply. This application also increases the circulation of the upper extremities and coincidentally the temperature of the parts is enhanced. Applications of ice on the dorsal and lumbar portions of the spine stimulate respectively the thoracic and abdominal viscera. Cold, applied to the lower lumbar and the sacral spine induced increased circulation of the lower extremities, and is utilized therapeutically for the relief of chronic cold feet. It is interesting to note that cold applied to the lower extremities, increases the temperature of the lower portion of the spinal cord.

Heat, applied to the spine, acts reversely from cold. Hot applications to the nape of the neck and back produces anemia of the brain and relieve active cerebral congestion.

Alternate cold and heat stimulate the spine most effectively. As noted in all other tests, the duration of these applications has a dual action—short applications of cold stimulate, long continued applications depress. Thus it has been noted clinically that cold applications of short duration on the cervical spine stimulate sexual function; excessive cold diminishes same, or has even inhibited it.

Cold applied to the lumbo-sacral region produces marked uterine contractions; alternate hot and cold applications to the same region have proven effective in cases of amenorrhea.

ACTION OF HYDROTHERAPY ON THE RESPIRATORY FUNCTION

The action of hydrotherapy on the respiratory function is chiefly reflex—affecting the frequency and depth of the respiratory act and with it the absorption of oxygen and elimination of carbon dioxid, ammonia, acetone and other accompanying excretions.

Application of cold—cold douche—cold baths, cold ablutions, cold applications to the cervical spine, primarily produces slowing and deepening of respiration with slight dyspnoea, holding of the breath, due to shock.

This retardation is due to irritation of the center of respiration in the medulla oblongata. With the retardation is associated an increased carbon dioxid production, and the latter again reflexly causes deeper inspirations to get rid of the accumulated gas. Thus if the cold applications are continued this reflex action so beautifully arranged by the economy causes continued deep breathing and increase in frequency of the breathing. Cold applications to the cervical spine are especially efficacious in producing deep respiratory efforts.

Heat also causes increased respiration with deep breathing and a marked increase in the amount of carbon dioxid exhaled and oxygen inhaled. Excessive heat or cold produce dyspnoea and oppression of breathing.

Clinically dyspnoea is relieved by the immersion of the hands and forearms into water of 110°–120° F. Mechanical aids to cold or heat, such as the needle bath, douche, etc., increase the respiratory action of either and are frequently employed in this connection. Vigorous affusions of cold water to the cervical spine and occiput, act favorably in asphyxia and in croupous attacks through reflex stimulation of the respiratory act. The value of these powerful aids in respiratory lesions—bronchitis, pneumonia and tuberculosis of the lungs—will be touched upon

when treating of these respective diseases. While the exact respiratory function of the skin has not been determined, it can be demonstrated that the skin exhales CO_2 , which can be stimulated to a marked degree by diaphoretic processes. Oxygen is also absorbed by the skin, so that similar to its adjuvant relationship with the kidneys, the skin fulfills a like rôle with the lungs. This partly explains the refreshing effect of bathing or ablutions in spring water in contradistinction with the flat sensation of these procedures from water of the same temperature taken from tanks or stagnant pools.

ACTION OF HYDROTHERAPEUTIC PROCEDURES UPON SECRETIONS AND EXCRETIONS

I. The Urine

Cold applications of short durations increase the secretion of urine, with temporary diminution of specific gravity. If the specific gravity is taken five or six hours after these stimulating procedures, the author has found the specific gravity in most cases to be slightly increased. The excretion of the end-products of catabolism are also increased by these measures. Urea can be increased from 15% to 25% by properly conducted stimulating procedures and uric acid, the chlorides and phosphates show similar increases. The elimination of uric acid is especially increased after cold half baths.

Phosphoric acid, owing to the increased tissue change induced by stimulating measures, shows an average increase of 25% in a number of test cases. The alkaline phosphates partake of this increase especially, the earthy phosphates showing little or no change. Excessive cold produces albuminuria and in some cases hemo-globinuria. The same results are noted in severe burns or scaldings.

Warm procedures by diminishing blood pressure and stimulating the action of the skin, diminish the volume of urine. Warm and hot procedures cause a *temporary increased voiding of*

urine, but *no relative increase*. In considering the action of either cold or heat on the excretion of urine it must be borne in mind that measures which increase blood pressure and increase the circulation increase diuresis, unless contraction of the renal blood-vessels exists at the same period. The application of heat over large areas of the body diminishes the acidity of the urine, and it may become alkaline in some instances. Cold baths increase the acidity of the urine. It has been found that an alkaline urine induced through vegetarian diet is rendered acid through a course of cold procedures.

II. The Feces

The action of hydrotherapeutic measures upon the quality and quantity of the feces has not been completely elaborated. Stimulating procedures increasing the flow of bile, the succus entericus and other alimentary secretions have a tendency to change the fecal constituents. Thus, in cases of jaundice, the clay colored stool will exhibit biliary additions after cold half or sitz baths. The amount of fluid ingested and the character of alimentation also exert influence so that the isolated effect of hydrotherapy is somewhat difficult to determine. The alvine secretion can be influenced by imbibition and local thermic influences. We can, in addition, accelerate or inhibit peristalsis through various degrees of temperature, this stimulation and inhibition also affecting the mucous membrane of the intestines with their associated glands and glandular adnexa.

Procedures acting upon the abdominal nerve supply in an irritating or stimulating manner, such as from cold applications of *short* duration, cold sitz baths, cold abdominal applications, will, as a rule, increase peristalsis.

Prolonged or continued cold procedures with active rubbing or massage, so as to induce hyperemia of the abdominal skin and reflexly anemia of the blood-vessels of the mesentery causes a *diminution* of the peristalsis of the intestines. This latter measure in the form of continued cold sitz baths (30 minutes) has been found valuable in chronic diarrheas.

III. The Sweat

This is a very important feature in hydrotherapeutic measures and the old water-cure doctors paid much attention to it. Increased sweat takes place whenever warmth is added to the body, or whenever warmth is prevented from leaving same or from irritation of special nerve centers. The excretion of sweat, varying according to temperature, exercise or other causes, averages from one and a half to two pounds daily in health. The amount and the various constituents of the sweat are changed in disease, and it is especially noted that when the kidneys do not functionate well that the skin will attempt to make up for the renal insufficiency by the increased elimination of urea, chlorides, carbon dioxid, indol, phenol, sulpho-ethers, and other products of waste.

It has also been found that bacteria are thrown off during active perspiration, thus anthrax, staphylococci and typhoid bacilli have been demonstrated in the sweat in cases of splenic fever, septicemia and typhoid fever respectively. These statements offer a great field for further investigation.

When we consider the large surface of skin covering the body and its ability to excrete through the sweat glands and through osmosis, materials of waste, the therapeutic care of this emunctory will appeal to all. In diseased conditions we have seen the sheets covering patients who were subjected to the sweating process, colored yellowish and even brownish from the excrementitious substances thrown off and the odors in some cases are positively nauseous.

Carefully conducted diaphoretic procedures increase the amount of sweat to a remarkable degree, and in all cases of toxemia—bacterial or auto—in all lesions due to retention or to insufficiency of some eliminating organ, the sweat-glands can be forced to take up the lagging function of such emunctory and assist in clearing the economy of disease products. Lesions due to retention of carbonic acid in the system also respond favorably when, through thermal activity, the sweat-glands eliminate an increase of volume of CO_2 . Increase of urea and uric acid elimination is also accomplished through increased

function of the sudoriparous glands. In alimentary, hepatic and intestinal lesions the skin can, through thermic processes, be forced to partly take up the work of elimination which these organs have failed to do.

IV. The Salivary Glands

The salivary glands excrete the salts of potassium, iodine and bromine; also urea and the xanthin bases. Locally, stimulation (cold compresses) can increase this function and restore normal activity in case of disease.

V. Carbon Dioxid

The recent researches of *Lahmann* (Germany) and *Couch* (United States) regarding the pathological changes caused in the economy by the retention of carbon dioxid, with its almost endless sequellæ render the subject of carbon-dioxid excretion and secretion of particular value at this time. As a basic statement it can be said that cold *increases* the gaseous exchange, while heat *diminishes* same. Carbon dioxid is eliminated in larger amounts, and the oxygen intake is increased by cold applications, while heat diminishes the output and in-take of the same gases.

These statements hold good as long as the applications do not influence bodily temperature to any marked extent. As soon as either cold or heat are *excessive or prolonged* so that either diminution or increase of temperature is experienced, changes in the excretion and absorption of gases are noted, the excessive *cold* inducing diminution, the increased *heat* greater gaseous exchange.

We note in these physiological tests as in many others, that *short* application of cold or warmth have diametrically opposed action from the same agents applied with intensity or excess.

The increase in carbon-dioxid excretion after *short, cold applications*, is explained on the theory of peripheral nerve stimulus reflexly accelerating metabolism. Increased muscular circulation takes place with coincident deeper respiratory action and increased carbon dioxid exhalation.

As already stated, this increase holds good only when the bodily temperature remains normal, changes in temperature of the body causing changes in the carbon dioxide cycle. When carbon-acidemia is present, the hot pack or prolonged electric light bath followed by stimulating cold applications (douches, rain-baths, air-baths, etc.) furnish therapeutic weapons of great value, and the increase of the oxygen intake and carbon dioxide output is marked.

ACTION OF HYDROTHERAPEUTIC PROCEDURES ON THE BLOOD AND LYMPH

Since the remarkable work of *Professor Bier* on "*Hyperemie als Heilmittel*" has gained more and more recognition and his technic bids fair to retain a permanent place in therapeutics, it is but just to emphasize the work of *Winternitz* and his assistants in elaborating the effects of thermic and mechanical measures on the circulation and the quality of the blood.

In another chapter we detailed the action of heat and cold applications upon the circulation—the blood-vessels and heart—showing how hyperemia and anemia, also ischemia could be induced at will, the therapeutic application of which will appear in subsequent chapters. Experiments made by the Vienna school on the quality of the blood gave the following results:

Cold thermic and mechanical procedures applied over the whole surface of the body produce an increase in the number of both red and white corpuscles. This increase is noted whether the blood is taken from the lobe of the ear and tip of the finger in man or from the spleen and liver in experiments on animals. The average increase shows 15%–20% increase in hemoglobin, from 200% to 300% increase in the local white blood corpuscles, and 25% increase in the red blood corpuscles. This increase is not constant, but recedes to the normal status in healthy individuals after a few hours; *in the anemic a slight permanent increase seems to be noted in the majority of cases.* Exercise after a short cold bath tends to still further increase the number of erythrocytes, so that in some test cases the count showed an

increase of 1,800,000 red blood cells per C. M., after the combined treatment.

Heat applied in the form of hot baths, hot sitz baths, hot steam-boxes, or Russian baths, shows in many cases a *diminution* of erythrocytes; in plethoric individuals a slight increase is noted some time after the treatment. The leucocytes are diminished as well as the hemoglobin and specific gravity. When profuse perspiration has supervened the cellular elements increase in numbers. The leucocyte count differs in many individuals after the application of heat. While the erythrocytes are usually diminished in number, the leucocytes have shown an increase in many cases, so that no absolute deductions can be vouchsafed on this point.

An important observation was noted that when cold thermic influences are applied over a small area, such as the feet, the erythrocytes taken from the lobe of the ear and tip of the finger show a diminution, while the parts treated show a marked increase of both erythrocytes and leucocytes. The latter condition only pertained when *hyperemia* of the parts supervened the treatment; when hyperemia was not secured a diminution of both cellular elements was observed.

Local application of *cold*, if followed by reaction, induces, therefore, *local increase* of the cellular elements of the blood, its hemoglobin and its specific gravity, while the blood at distant parts of the periphery shows a diminution of these characters. Local applications of *heat* applied as fomentos or hot applications show different effects. The red blood corpuscles show marked *diminution* locally, while the leucocytes usually are increased.

Winternitz explains these observations by the changes in the distribution of the blood induced respectively by cold and heat, the former stimulating the blood distribution with increased tonicity, the latter producing passive stasis. The increase of erythrocytes may be explained through the reflex stimulation and increased blood pressure throwing the blood corpuscles in a more rapid manner than usual into the general circulation. The application of heat on the contrary induces stasis with lowered blood pressure.

The application of cold increases the alkalinity of the blood; heat increases the acidity of same by increasing largely the amount of acid phosphates. After hot applications catabolism is greater than oxydation with consequent acidity; cold applications increase oxydation with consequent alkalinity.

Excessive and prolonged cold and hot baths produce destruction of erythrocytes with urobilinuria and hemo-globinuria.

With these collected facts of the action of cold and hot procedures before us, it cannot be emphasized too strongly that the application of all hydrotherapeutic measures must be made with due regard to physiological consequences, and that excessive extremes (ice-baths, etc.) must be avoided.

The lymphatic circulation, according to *Kowalski* (*Blaetter fuer Klinische Hydrotherapie*, No. 1 and 2, 1901), is increased during cold applications.

On cessation of treatment after a short period, the normal flow is again established. Heat increases the flow of lymph but slightly, to be followed very quickly by a restoration of normal conditions. The application of heat followed by cold shows that the latter has the stimulating property, acting upon the vasomotor nerves of the lymphatics, producing increased tonicity with contraction and subsequent dilatation.

ACTION ON METABOLISM IN GENERAL OF HYDROTHERMIC AND MECHANICAL PROCEDURES

As already mentioned in the chapter on carbon dioxid excretion, ordinary cold procedures increase oxydation with coincident carbon dioxid exhalation. Heat causes a diminished oxygen intake and carbon dioxid excretion. When the temperature of the body becomes *lower* than normal it protects itself by diminishing oxydation owing to diminished metabolic processes. When the temperature is increased metabolism increases to a certain point. Ordinary cold procedures stimulate muscular action with increase in gaseous exchange, but if same become *excessive* the opposite results are noted with albuminous disintegration in some cases. Clinical experiences show that with

rational hydrotherapeutic measures metabolism, bodily weight and nutrition can be influenced at will.

The experiments of *Strasser* (Vienna) show that the nitrogen cycle is markedly influenced by stimulating processes. The urine shows increased urea, the feces diminished nitrogen end-products.

The urea increase in the urine was constantly noted during these tests.

Uric acid and xanthin bases show interesting changes. Uric acid shows but little change during the baths, while urea is increased and the xanthin bases diminished, the latter fact being referable to increased oxydation. The increase in urea is theoretically explained by the fact that uric acid elimination itself shows no change in spite of increased oxydation, so that it is assumed that surplus uric acid is converted into urea.

Increased metabolism also produced changes in the alkalinity and acidity of the fluids. Organic acids are consumed through stimulating processes and are no longer able to combine with or neutralize ammonia. This fact explains diminished acidity and the disappearance of acetone in many cases after hydriatric procedures.

Phosphoric acid shows marked increase after treatments, the increase being due to increased metabolism of phosphorus compounds contained in the food, and but slightly due to disintegration of the nucleins and the blood. Sodium chloride and sulphuric acid also show increases due to similar causes as with phosphoric acid as well as due to increased renal function following rational stimulation.

Free hydrochloric acid is markedly diminished in the gastric secretion after Russian and Turkish baths; in some cases it remains absent for hours or days after excessive heat—this being explained through the sudoriparous excretion containing after hot procedures traces of sodium chloride.

CHAPTER III

REACTION AND OTHER PRINCIPLES OF CURE INVOLVED IN HYDROTHERMOTHERAPY

The successful result of all hydrothermic applications depends on the ability of the organism to replace the primary action of the agent with the secondary reaction, which is usually opposite in effect from the primary.

To secure such reaction each case must be individualized and treatment given accordingly. The action of cold and heat and of mechanical influences on the nerves and blood-vessels must be borne in mind. If powerful reaction is required, the measures must be regulated accordingly. As a basic rule it must be remembered that cold must be applied only with the parts in *a warmed state* so as to secure good reactive response. Mechanical irritation, friction, massage and chemical additions to the water increase the reaction. Exercise increases reaction also, while rest retards it to some extent.

Excessive cold causes delayed or excessive or incomplete reaction, in some cases producing febrile symptoms. When reaction is unsatisfactory, collapse has supervened in some instances.

The temporary shock of a cold bath followed by the so-called "glow" is the reaction we desire of an active character, with primary contraction followed by dilatation of the blood-vessels. The temporary sensation of heat, followed by relaxation, sedation, and lassitude after hot application, can be designated as passive reaction and has its application also.

Kellogg (Rational Hydrotherapy) has arranged the following tables of "action and reaction" of short cold and hot procedures, which give a good review of this subject.

SHORT, COLD PROCEDURES**ACTION**

1. Contraction of the small blood-vessels of the skin with dilatation of internal vessels after a very brief contraction.
2. Pallor of the skin.
3. Goose-flesh appearance and roughness of the skin.
4. Sensation of chilliness.
5. Trembling, shivering, chattering of the teeth, in some cases decidedly painful and distressing sensations of "constriction," etc.
6. First quickening, then slowing of the pulse, with increase of tension.
7. First checked, then quick, deep gasping respiration.
8. Cooling of the skin.
9. In most cases slight rise of internal temperature.
10. Perspiration checked.

REACTION

1. Dilatation of the small blood-vessels of the surface with contraction of internal vessels
2. Redness of the skin.
3. Skin soft, smooth and supple.
4. Sensation of warmth.
5. A sensation of comfort and well-being.
6. Slowing of the pulse with increased tension.
7. Respiration free, slower and deeper.
8. Heating of the skin.
9. Fall of internal temperature.
10. Increase of perspiration.

SHORT, HOT PROCEDURES**ACTION**

1. Brief contraction, then dilatation of the surface blood-vessels, especially of the small veins.
2. Slight pallor, if previously red, followed by dusky redness.
3. Sometimes goose-flesh appearance and slight shivering.
4. Slowed then quickened high tension pulse.
5. Respiration at first checked, then frequent, CO_2 diminished.
6. Perspiration at first checked, then increased.
7. Heating of the skin.
8. Rise of internal temperature from diminished heat elimination.
9. General nervous excitation; at moderate temperature, sense of comfort and relief.
10. Increased muscular irritability.

REACTION

1. Vaso-constriction.
2. Pallor.
3. Skin smooth, soft and moist.
4. Pulse frequent, tension low.
5. Respiration frequent, free, superficial, CO_2 increased.
6. Perspiration lessened.
7. Gradual cooling of the skin.
8. Depression of internal temperature from increased heat elimination and decreased heat production.
9. Diminished nervous and mental irritability, drowsiness and depression.
10. Muscular weakness and indisposition to muscular effort.

"From the above it will be readily apparent that the general and usual reaction effects of heat are of an atonic or depressant character."

These observations permit scientific treatment on a physiological basis.

Another principle of apparently universal application is the principle of reciprocal curative relationship between the action of prolonged powerful treatments with hydrothermic procedures and the curative effects of mild treatments of the same kind when symptoms similar to those produced by the powerful treatments above mentioned are found in the sick.

Who has not noticed the inhibitive effects on peristalsis of *prolonged* cold applied in the form of sitz baths or ice-packs? Who, on the other hand, is not aware of the stimulating effects of *short*, cold, half or sitz baths upon the peristaltic wave?

We note that *excessive* cold applications if prolonged, produce reduction in hemoglobin with diminution of erythrocytes. On the other hand *short*, cold stimulating procedures are excellent in anemia and chlorosis.

Prolonged hot applications cause an increase in temperature and increased metabolism; short, hot applications cause a fall of temperature with diminished metabolism.

"Very *prolonged* hot applications give rise to muscular weakness; notwithstanding these facts, experience shows that very *short*, hot applications are the best of all means for recovering a person exhausted by prolonged or violent exercise."—*Kellogg*.

"Short, cold applications to the skin being followed by dilatation of the surface vessels favor perspiration; while prolonged, cold applications have the opposite effect."—*Kellogg*.

This relationship of the *opposite* effects of *prolonged* and *short* applications of either hot or cold procedures can be fortified by innumerable quotations taken at random from any modern work on hydrotherapy, and points unerringly to the underlying principle or law which has its analogy in drug therapeutics and has been expressed by the formula *similia similibus curentur*.

These statements being accepted as true (and all or any modern textbooks on hydrotherapy will verify them), it appears to the writer that if we are cognizant of the physiological action of

prolonged hot or cold procedures on the economy, we ought to be able if confronted in a case of disease with similar symptoms to relieve or antidote them with a *short* hot or cold procedure of similar application. The action, on the other hand, of intense, short, hot or cold applications being known, the opposite or curative effects of the symptoms or actions thus produced will be consummated by *prolonged, similar* procedures.

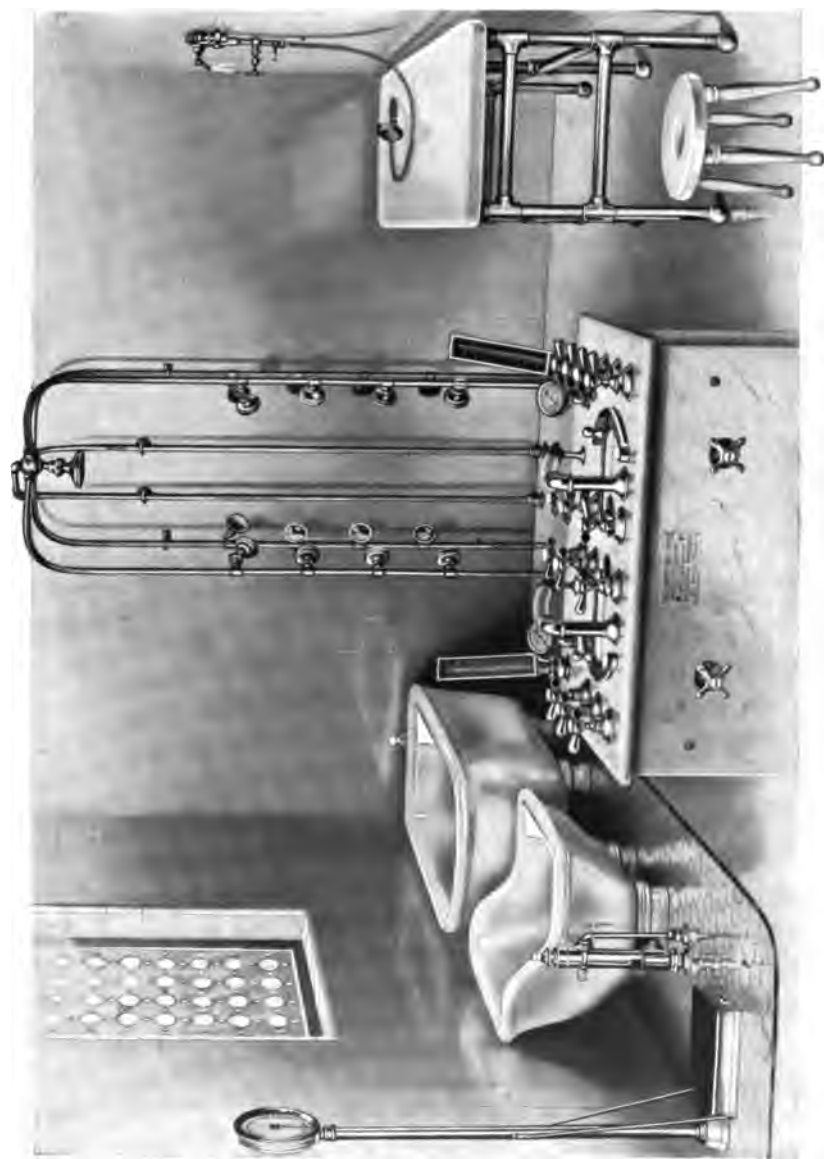


Fig. 1. Complete Hydrotherapeutic Chamber.

CHAPTER IV

TECHNIC AND INDICATIONS OF THE PRINCIPAL HYDROTHERAPEUTIC PROCEDURES

(See Figure 1.)

Disappointment awaits the physician who, without proper appreciation of physiological action or proper technic, attempts to use hydrothermic measures in his practice. How many failures in the use of the *Brand* bath in typhoid fever are referable to ignorance of proper technic!

It cannot be too earnestly emphasized that individualization and exact technic is absolutely requisite as much in hydrothermotherapy as it is in the most spectacular surgical operation. The apparent simplicity of the "water-cure" has led many a good physician to apply it improperly or imperfectly, and after a brief but unsuccessful trial abandon this valuable therapeutic measure as of no importance. It is to be hoped that with the introduction of hydrotherapy into the curricula of all medical colleges as much attention to detail will be given to this study as to all other branches of the science of medicine.

GENERAL MEASURES

As a *general rule*, it is best to apply hydriatric procedures at least half an hour before meals or two hours after same; not too early nor too late in the day. The room should be well ventilated and no draughts permitted. The temperature of the room must not be too cold nor should the place be reeking with dampness. In applying active measures, in order to obviate cerebral congestion, the face, neck and chest should be quickly washed with cold water and the bladder and intestines should have a preliminary clearing, and during most treatments the drinking of

liquids is desirable. In the application of all cold measures the body should have been warmed so as to induce proper reaction. Friction or mild massage is also advisable in the majority of cases and must never be omitted in giving cold baths or applications in cases of hyperpyrexia; it is this omission to the *Brand* bath which has usually given disappointment to physicians in the use of this measure. Cold ablutions must *always* be given after hot applications excepting when hypnosis and sedation is striven for. *Rest* is enjoined after most treatments.

The scope of this work precludes the naming and describing of some of the varieties of hydrothermic measures; we will confine our studies to the most important and most generally applied procedures. These include:

1. *Baths*: (a) half bath; (b) full bath; (c) sitz bath; (d) foot bath; (e) hand bath.
2. *Douches*: (a) general and local.
3. *Affusions*: (a) general, and (b) local.
4. *Ablutions*: (a) general; (b) sectional, and (c) local.
5. Packs, compresses, fomenta.
6. Ice bags, hot water bags, coils and tubes.
7. Turkish and Russian baths; steam boxes; dry hot-air apparatus.
8. Imbibition, lavage, irrigation, clysis, enemata (simple and retention).

The temperature terms (in Fahrenheit) employed are according to *Doctor Forbes'* specification: Hot, 105° F.; warm, 95° to 100°; tepid, 85°; temperate, 78°; cold, 65°, or less.



Fig. 2. Half-bath Tub.



Fig. 3. Elevated Bath-tub for Bathing Infants and Children.

CHAPTER V

THE HALF BATH

The half bath is one of the most useful and most generally applied of hydropathic measures. It is given preferably in a wooden tub of suitable size, although in private practice the ordinary bath tubs of commerce will have to serve the purpose. The average length of the wooden tubs used on the continent of Europe are 5 feet, with 30 inches width and about 24 inches height. (Figs. 2 and 3.)

The water in the tub should be sufficient to reach 2 inches above the crest of the ilium. With the general measures already described properly executed, the patient is placed in the tub of cold water and the whole body quickly immersed in the water for a few seconds, then the patient sits erect and is encouraged to rub his face, neck, chest and arms while the attendant rubs the lower extremities and trunk. The attendant interrupts the rubbing process every half minute to pour cold water from a small pail or pitcher over the spine, abdomen or chest and then resumes the friction. The temperature of the water used and the duration of the bath depends on the case. In hyperpyrexia and toxemia a 5 to 10 minute bath with water at 60°-65° F. is efficient. The number of baths per day also depends on the reaction and the character of the disease; in the majority of cases two or three baths a day suffice; in some typhoid cases the bath is repeated every 3 hours, day and night, until results are obtained.

Warm half baths are prescribed for sedative purposes and can be combined with cold ablutions or affusions for stimulating reaction if same is desired.

Hot half baths are recommended for eliminating purposes (auto-toxemia) and the temperature, duration and repetition is regulated according to the case. It is this responsibility of deter-

mining the patient's reaction and resistance to these measures that makes hydriatric procedures a study of judgment and experience, and the successful practitioner in hydrotherapy is the one who individualizes his cases and prescribes the temperature, duration and repetition of the baths on each separate individual case as he confronts it. With a clear conception of the physiological or reciprocal action and reaction of these modalities before him the physician can never go amiss, but if in doubt, it is desirable to err on the side of moderation rather than to go to extremes in applying said measures.

After the bath, the patient is rubbed dry (being encouraged to assist in this process, when possible) and either returned to bed and covered warmly or, if in proper condition, ordered to take a walk to induce reaction. Whenever during the bath the patient chatters or becomes cyanosed, he must be immediately removed from the bath and placed in a warm bed, with hot water bags or bottles at his feet and thighs to secure reaction.

Half baths are particularly to be thought of when full baths cannot be taken; they do not overtax the circulation and heart, and act more mildly than full baths.

Winternitz recommends half baths for two to three minutes daily at 50°-53° F. with active friction, in anemia. If the temperature is taken higher the time of immersion must be increased.

Half baths are also applicable in spinal diseases, pulmonary diseases and the exanthemata and are to be preferred in children and in old people, as they can be handled better and friction more readily applied.

Hot half baths are invaluable in meningitis, in cholelithiasis, nephrolithiasis, rheumatism, enteralgias, neuralgia, catarrhal or interstitial nephritis and in genital irritations.

The technic of hot half baths consists in preparing the patient as usual, the water being tempered to 95° F., and when the patient is seated or semi-recumbent adding the hot water until 105° F. is reached. This temperature may be exceeded in some cases, but after each bath a cold, quick, ablution is indicated.

Cerebral and spinal neurasthenia are markedly benefited by



Fig. 4. Portable Full-bath Tub.

half baths given at the indifferent zone (95° F.) prolonged for 20 to 30 minutes, with mild, superficial massage. While no distinct physiological action has been observed, distinct relaxation and sleep is secured, especially if suggestions to this end accompany the procedure. These baths are, therefore, also valuable in insomnia. No cold ablution should follow these baths if given for hypnotic purposes.

The author's technic of half baths in pyrexia and toxemia in children consists in arranging the bath at 95° F., then gradually permitting cold water to be added until after 15 minutes the temperature registers at 65° F. Mild friction all over the body is kept up during immersion, and after the bath the child is rubbed gently and placed in a freshly prepared bed. Liquids are usually given during the bath, hot lemonade being preferred where elimination is striven for. This graduated bath is repeated every 3 or 4 hours until improvement becomes marked, when two baths a day suffice until convalescence.

Professor Winternitz recommends cold half baths with affusions of cold water on the abdomen (*Bauchguss*), pouring same from 3 to 6 feet distances over the abdomen—as an adjunct in atonic constipation to induce peristalsis. This affusion may be given from a bucket of water or a smaller vessel, and repeated at regular intervals, the patient in the meantime rubbing his own body and limbs to produce general reaction.

CHAPTER VI

THE FULL BATH

The full bath, while usually employed cold, is also coming into general use (especially in psychiatry) as a warm and hot bath.

As a cold bath it is one of the most effective methods for stimulating the peripheral nerves, and reflexly the whole nervous system, and inducing reaction, in our armamentarium. (Fig. 4.)

The *Priessnitz* method consisted of inducing preliminary diaphoresis by the dry pack, and when warmed and perspiring immersing the patient up to the neck in a cold tub 50°-60° F., moistening face and chest beforehand and using friction during the immersion. This immersion was gauged according to the case, but 30 seconds to 1 minute was the usual time. Cases of disease are, however, reported where *Priessnitz* kept patients in the cold bath for hours at a time, a relay of orderlies being commanded to keep up the friction while in the water.

*Ripper** (*Priessnitz*' son-in-law) reports a case of uremia treated in this fashion.

The technic for cold, full baths given for purposes of stimulating the nervous system and bringing about reaction and dermal hyperemia and activity—especially indicated when hyperpyrexia is present—consists in preparing the patient—*lege artis*—arranging the water in the tub or pool at 65° F. (agitating the water so as to have an even temperature) and in a warmed state seating the patient for a second in the water and then quickly immersing the whole body up to the neck in the water. Friction must be started as soon as the patient is recumbent in the bath, rubbing from below upwards and encouraging the patient (if he is able to do so) to rub his chest and arms. The time of immersion varies from 1 to 10 minutes, the latter maximum

* *Ripper-Erinnerungen von Graefenberg.*

being employed in rare instances. Five minutes is a good mean, and reaction following this time is usually satisfactory. If evidences of collapse are noted—cyanosis—the patient must be stimulated with a hot drink and removed to a couch or bed and warmth applied to the feet and thighs. After the bath the patient is rubbed dry and returned to bed.

Repetition of the cold, full bath depends on the case, but the rule formulated by *Brand* in the treatment of typhoid fever, that whenever the temperature in the rectum registers 103° F., the bath must be repeated, is a good one. In ordinary practice two full baths a day—one at 10 A. M., the other at 4 P. M., are the rule.

Contraindications for the cold, full bath are advanced cases of pulmonary tuberculosis, advanced cases of diseases of the heart, marked arterio-sclerosis, aneurism of the aorta, and asthenic cases where the vitality of the patient is poor, in which contingency milder measures are requisite.

Indications for the cold, full bath are *diseases associated with fever* (excepting when contraindicated, as above), diseases of nutrition and suboxidation, such as oxaluria, uric acid diathesis, carbon acidemia, obesity and diabetes. The bath is also indicated in health, providing a warming process precedes the cold immersion. Full baths given at the indifferent zone for 20 to 30 minutes are recommended for insomnia.

Full baths taken at 98°–100° F., *if prolonged for one to two hours*, act well in chronic rheumatism of the joints and muscles, in chronic spinal lesions and in anasarca. They are also invaluable in psychiatric practice. In the latter the technic of keeping the patients in the full bath for many hours at a time has proven so successful as to find emulation in most progressive institutions. In these cases, suitable supports to the head and neck, also hammocks for the trunk and extremities, are provided and the patient is thus suspended in the bath. This arrangement also permits restriction of movements of the patient in cases of violence.

Hot, full baths, 105°–115° F., are popular in Japan. The technic is as follows: The patient is washed or sponged off with hot water, including the head, and is then placed into the

selected bath for three minutes. The patient then leaves the tub, is washed off once more with hot water and douched with same, and returns to the hot bath once more for two minutes. Rest is enjoined after this procedure. Habitues of this kind of bath sometimes use the water at a temperature of 130°–140° F., but the milder degrees, 110–112, are most in vogue. The physiological effect of this so-called Japanese bath undoubtedly is eliminative, and if combined with rubbing and friction, stimulating to a certain degree.

Hot, full baths are invaluable in nephritis (although half baths are preferred in many cases); in delirium tremens a hot, full bath prolonged for 30 minutes to 1 hour quiets the patients, relieves the kidneys, and if the patient receives a mild ablution of temperate water after the bath, sleep is induced. Prolonged hot full baths have been found valuable in chronic joint rheumatism, gout, colic, sciatica, neuralgias and as an adjuvant in syphilis.

The cold, full bath recommended for old people and children, and also for such patients who have a dread of cold water—hydrophobics—is administered as follows:

1. Arrange the temperature of the water 10 to 15 degrees below the patient's temperature.

2. After the approved preliminary preparations, place the patient in the tub and gradually add cold water until after 20 to 30 minutes the thermometer at the foot-end of the bath registers 65°–70°.

3. Friction all over the body is indulged in during the course of the bath, and the patient is instructed to rub himself also and is then returned to bed. This bath is particularly indicated in the Exanthemata.

There are a number of modifications of the half bath and full bath—the hip bath, high bath (*Hoch-bad*), plunge bath, wave bath (*Wellen-bad*) hydro-electric bath, for which special indications have been found by hydrotherapists. For the technic of these baths we must refer to larger works on this subject. One modification we desire to give in detail, owing to its popularity as a factor in the treatment of certain cardiac lesions. We refer to the



Fig. 5. Flowing Sitz-bath Tub.



Fig. 6. The Author's Sitz-bath Tub for Administering Hydro-electric Treatment.

Carbonic Acid Bath

In Nauheim, Oeynhausen, Kissingen and other springs, the natural carbonic acid gas is utilized and the physicians of Nauheim particularly have elaborated a technic which we will detail in the therapeutic section on diseases of the heart.

Artificial carbonic acid baths can be prepared and administered at the home or hospital as follows: The full bath is prepared at 87°-90° F. and the artificial Nauheim salt (Triton Company or Cassebeer's) placed on four squares of tinfoil in four portions of the tub. In lieu of artificial prepared salts, a solution of sodium bicarbonate, four ounces, dilute hydrochloric acid, five ounces, dissolved in three to five pints of water, is carried to the bottom of the layer of water by means of an irrigator and the gas is permitted to permeate the water. Ordinary table salt, six ounces, added to the water increases the action of the bath. These proportions may be increased, depending on reaction desired. Lebram's Formica Co.'s bath compound is also efficient for the evolving of quantities of the gas. It is desirable in all these artificial "Nauheim" baths to cover the tub with a cloth and have an opening for the patient's head, so that the air is not contaminated with the gas. If this precaution is omitted irritating coughs may be caused. The time of immersion must be determined by the indications, but 10-15 minutes usually suffices, with subsequent rubbing and passive exercises as required for each individual patient. The temperature of the bath is gradually lowered daily or bi-weekly, depending on the reaction, until 70° is reached. These baths are given daily, excepting one day per week which is observed as a day of rest. They produce marked dermal hyperemia, and the heart muscle is relieved of stress and strain through the flooding of the superficial capillaries and arterioles with blood during the whole period of immersion. The action is said to be analogous to that of digitalis without the cumulative toxic results of the latter, and the heart muscle responds very well to judiciously supervised treatments. The technic of the Nauheim baths is given in detail in the chapter on Diseases of the Heart.

CHAPTER VII

THE SITZ BATH

The sitz bath is a very useful appliance and should preferably be administered in a wooden vessel constructed for this purpose. As the derivation of the word indicates, it is given in a sitting position with the pelvis of the patient immersed in the tub and the lower extremities extruded and covered warmly with blankets or cloths. A pad of toweling is placed under each popliteal space to prevent pressure. The patient is prepared as usual, and only a *few inches of water* placed into the tub at the determined temperature. If too much water is put into the tub by the inexperienced, the displacement of the pelvic portions of the patient's body will cause the water in the tub to inundate the flooring. When the patient is seated, additional water as required may be added. Some of these tubs are arranged with stoppers, so that a flowing sitz bath can be arranged through the influx and efflux of the water. (Figs. 5, 6 and 7.)

In giving hot sitz baths the water is arranged at 85°–100° F., and the hot water added with the patient *in situ*. In these baths a cold turban is worn about the head to prevent cerebral congestion, as the circulation of the brain can be reflexly affected to a marked degree by these localized applications of hot or cold water, and the parts not immersed are well covered with Turkish towels or blankets. While in the bath (if stimulation is indicated) the patient is directed to rub the abdomen and thighs.

Cold sitz baths of short duration (50°–65° F.) are usually given from 2 to 5 minutes. As these baths are prescribed for stimulating purposes, the patient is directed to massage the abdomen continuously during immersion—in atony of the bowels the massage should be directed from the right inguinal region upward, then following the transverse colon, then downward to



Fig. 7. Sitz-bath Technic.

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the left inguinal region, this movement, like an inverted U being in the direction of the peristaltic wave. These baths are repeated daily and are beneficial in *anemic conditions* of the abdomen and pelvis such as cause constipation, amenorrhea, leucorrhea, prolapsus uteri, incontinence of urine and prolapsus recti et ani.

These stimulating baths increase local circulation by inducing active *hyperemia*, and the increased blood supply tones up the local organs. Prostatorrhea and sexual debility are, therefore, benefited by carefully conducted cold, short sitz baths. Mucoid conditions of the bowels also respond to the same principle.

They are also recommended for their derivative effect to relieve cerebral hyperemia. In these cases the cold, short sitz bath is repeated every 10 minutes for half an hour, or until relief is noted, and the patient then retires to rest.

Prolonged cold sitz baths (50°–65° F.) given for 20 to 30 minutes, have an inhibitive effect. They produce local anemia and also anemia of the pelvic organs; they slow or inhibit peristalsis. This physiological action is utilized in severe proctitis, in severe hemorrhoidal conditions, in chronic diarrhea, in dysentery, prostatitis and some forms of cystitis.

Prolonged warm sitz baths (95°–105° F.) for 20 to 30 minutes, are employed for their sedative effect; they relieve colic, intestinal and uterine, and produce mild, local passive hyperemia.

Hot sitz baths (105°–120° F.) are best started at the indifferent zone, and the hot water added when the patient is seated. The length of time of immersion depends on the case, but 10 minutes is the maximum in many cases at the beginning. On repetition, the time can be prolonged in some cases to 20–30 minutes. These hot procedures are indicated in colic, inflammations and spasms of all kinds referable to the pelvis; severe cystitis, severe urethritis, chordee, prostatitis, orchitis, epididymitis, perimetritic and parametritic exudates, salpingitis, dysmenorrhea and in sphincteralgias, fissures and spastic constipation. Pelvic neuritis and ovaritis is also palliated, and in some cases cured, by judicious repetition of these baths.

After cold sitz baths given for stimulating purposes, exercise assists materially in bringing about reaction. After hot sitz

baths, *rest* is imperative. Cold sitz baths given for their reflex derivative effects, as in cerebral congestion, should be followed by rest and relaxation also.

In the treatment of hemorrhoids, prostatitis and sexual debility, the alternating hot and cold sitz bath (of short duration) is serviceable. The heat acts as a sedative, and if followed by short, cold procedures the tonic effect required in these cases is secured.

The Nature or "Natur" Bath

The technic of the so-called "Natur" bath consists in immersing the lower buttocks, anus, perineum and *sexual organs* in either cold or hot water depending upon the effect desired. The true Natur bath is given *cold* for a period varying 1-3 minutes, and the parts are well rubbed after the immersion. The sympathetic system can be intensely stimulated by this measure and it is recommended as a tonic of the greatest value.

Hot immersions, similar to sitz baths and T bandages, relieve nerve-pain and act as a sedative. The bath is usually prescribed twice daily.

CHAPTER VIII

THE FOOT BATH

The foot bath is administered by immersing the feet up to the malleoli in water, using friction or rubbing them together while in the water. The modification made popular by *Father Kneipp* in the past decades consisted of walking barefoot in the dewy grass and drawing the feet along the grass so as to induce friction.

Treading water is also a modification used in sanatoria, and consists of active movements of the feet—treading and rubbing the soles of the feet in the tub or basin while same are immersed. Specially constructed apparatus has been made to administer the flowing foot bath. The water flows into the vessel at the bottom and leaves at the top. This has the advantage of keeping the temperature of the water at the same degree as prescribed.

In prescribing these baths a cold turban should be worn about the head and the face, neck and chest should be moistened with cold water *before* the treatment, in order to obviate reflex congestion of the head.

The cold foot bath is given at 50°–60° F., and the feet are kept moving while in the water, or are rubbed by an attendant. The duration varies from 3–10 minutes and repetition depends on the object desired. Usually two baths a day suffice, one in the early morning, the other during the late afternoon.

Cold foot baths, of short duration, act reflexly on the abdominal, pelvic and cerebral circulation in a stimulating manner; they produce contraction of the uterus, bladder and involuntary muscles of the intestines. On account of the contraction induced in the uterus, these baths are strongly contraindicated in early pregnancy, as abortions have been caused through their use; they are also contraindicated in cystitis. Habitual cold

feet, the tendency to catarrhal conditions of the nose, throat, larynx and bronchial tubes, weak ankles, hyperhidrosis and chilblains are distinctly benefited by carefully prescribed short, cold, foot baths.

Hot foot baths (105°–120° F.) are given for 10 to 30 minutes (depending on the case), the lower extremities being immersed up to the popliteal spaces. After the hot foot bath the feet should be quickly rubbed with cold water and then wrapped up warmly. The hot foot baths produce marked dilatation of the blood-vessels of the lower extremity and reflexly relieve congestion of other organs, especially of the brain and pelvis. They are used, therefore, largely for their derivate effect in insomnia and congestions of the uterus or ovaries.

Hot foot baths also act well in local sprains, congestions or injuries.

The alternate hot and cold foot bath is also useful in some cases. The technic consists of immersing the feet in hot water three minutes, then in cold water half a minute, and repeating the process *three* times at one treatment. For passive edema of the ankles this has proven a valuable adjuvant to medical treatment. The feet and ankles must be well rubbed after each seance, and same can be repeated three or four times daily. Hyperhidrosis of the feet and chilblains are also benefited by the alternate hot and cold foot bath, and may be preferred to the simple cold foot bath in special cases. When cold foot baths are given for their derivative effects on the pelvic or abdominal organs, a brisk walk after the treatment is advocated.

CHAPTER IX

THE HAND BATH

Hand baths can be given in any suitable vessel which will permit introduction of the hands up to the elbow. Special little tubs are made with a perforated cover to permit introduction of the hands with provision for the inflow and efflux of water. In private practice two buckets or pails of ordinary commerce will serve the purpose.

These baths may be taken cold, hot or alternately hot and cold.

The cold hand bath is given at 45°–60° F. for 3 to 5 minutes, the hands being rubbed briskly while immersed. It is valuable in hyperhidrosis of the hands, and its reflex derivative action is said to be beneficial as a stimulant to cardiac and respiratory function.

The hot hand bath is given at 105°–130° F., and has a general warming effect, usually causing abundant perspiration, and is often prescribed as a preparatory treatment to general measures, such as the half bath or douche. It is employed in gouty and rheumatic conditions of the hands and wrists—teno-synovitis—tennis-player's wrist, for mild cases of occupation neuroses such as beginning writer's cramp, telegrapher's, piano player's and needle-women's cramps, etc. It has been used clinically in periostitis, felons, local inflammations and in chronic respiratory affections, such as emphysema and asthma.

Asthmatics often derive much benefit during an attack by the immersion of the hands and forearms in very hot water and by resorting to this method three or four times daily often abort the attacks. Each hot immersion should be followed by cold ablution of the parts. The time of immersion and repetition of treatment depends on the case, but 10 minutes is the average length of treatment.

The alternate hot and cold hand bath is administered as follows: Two vessels are prepared, one containing hot, the other cold, water. The hands and forearms are plunged into the hot water for 3 minutes, then into the cold water for $\frac{1}{2}$ minute, and this is repeated three times in one seance. The alternate hot and cold hand bath is efficacious in some cases of epistaxis and in mild hemorrhages from other parts; it is also beneficial in occupation neuroses, chilblains, and as a general tonic to improve the circulation of the hands and wrists after fractures or sprains.

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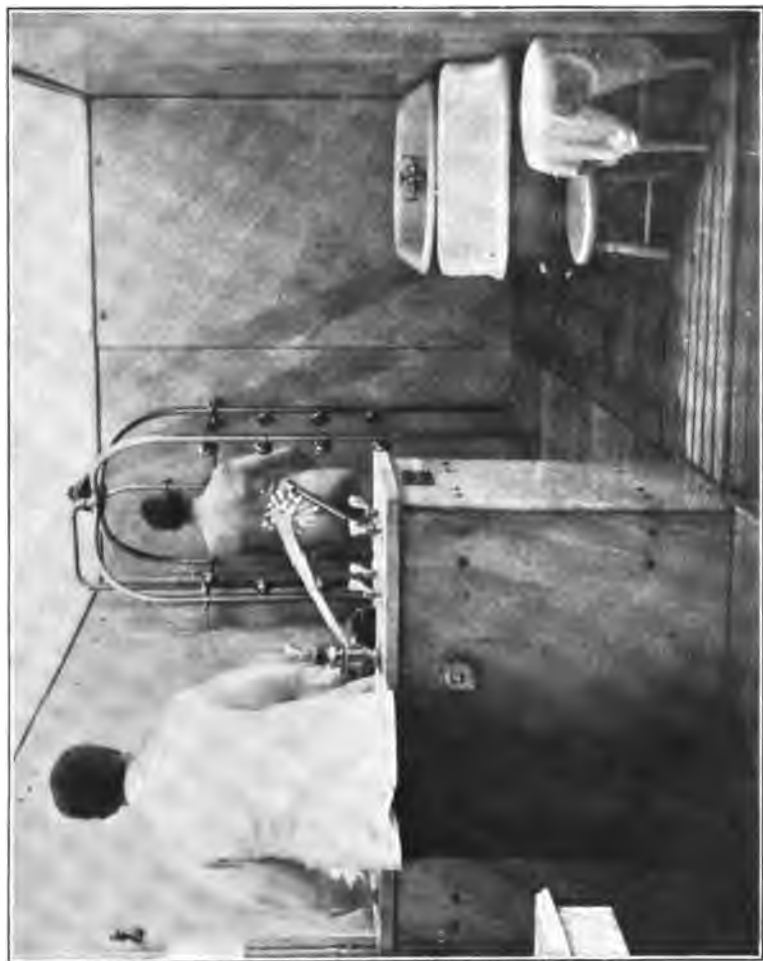


Fig. 8. Douche Room, Hydro-Therapeutic Institute, New York.

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CHAPTER X

DOUCHES

The douche was largely used by *Priessnitz*, the pioneer of modern hydrotherapy. He had tubes running from springs in his woods and permitted the water to fall from varying heights upon the parts to be treated; the higher the fall the more vigorous the action and reaction.

Father Kneipp used a sprinkling pot and applied it in certain cases of joint disease with much success.

Douching as at present administered requires special apparatus, and while home and portable appliances can be utilized, the treatment with douching properly belongs to sanitarium equipment. Douching differs from bathing inasmuch as much or little mechanical force can be added to the thermic effects of the water and various results obtained. (Fig. 8.)

Professor Simon Baruch deserves great commendation for his indefatigable advocacy of the rain douche or shower bath in public institutions and tenement houses, and the rapid adoption of this method in public buildings for providing cleanliness of the body and general stimulation is mainly due to his initiative. The shower bath is more hygienic in every way than the bath tub, and *infection* is obviated through its use. *Doctor Baruch's* efforts for this improvement in hygiene will be the means of obviating much disease and contact infection, and he deserves public recognition for his services in this field.

Douches may be local or general; they may be administered hot or cold, or alternately hot and cold and in various degrees of volume with different degrees of pressure. Steam may also be administered as a douche. Many variations of douches are devised, among which may be mentioned the needle, spray, atomizer, fan douche and nozzle hose.

The shower bath or rain douche is administered over the whole body in the form of a fine shower (excluding the head) for from

$\frac{1}{2}$ to 2 minutes, at a temperature usually of 80°–90° F., and is followed by a cold general spray of $\frac{1}{2}$ minute. The temperature of the water must be judged for each individual case and repetition also regulated accordingly. (Fig. 9.)

The **Scotch douche** requires two hose attachments, one for cold, the other for hot water. The part to be treated is subjected to the *hot steam* for 2–5 minutes, to be followed by a quick shower of *cold water* for 5–10 seconds only. This alternating treatment is repeated two or three times at one session if necessary, to bring about results, and must always be followed by a short rest. The force and impact of the water must be deliberated upon for each case, as very vigorous reaction can be secured by this technic. The Scotch douche is particularly efficacious in lumbago, sciatica and in some neurites.

The **Steam douche** must be handled with care to avoid scalding the patient. The steamcock should be opened with the hose *away* from the patient, and the water permitted to flow out before permitting the steam to strike the parts. Its action is reflexly sedative and produces marked local hyperemia.

The **Perineal douche** is arranged so that a stream of water is projected *upward*, so that the patient seated on a perforated stool receives the impact upon the perineum. It is used either hot or cold, and the physiological effect responds to the indications of these thermic modalities. The cold perineal douche can be applied in hemorrhoidal conditions and in conditions of the genitalia where stimulation is desired. The hot perineal douche finds usage where relaxation and sedation is striven for. (Fig. 10.)

Eye, ear, nose and throat douches, as well as vaginal douches, have been applied on special indications. In sanatoria the technic for the *shower* bath, or rain bath, or douche is as follows: With the usual preliminary preparation, the breast, neck, then the spine is treated, then the abdomen, limbs and feet, the patient meanwhile rubbing his parts energetically. The head is usually kept out of the shower, a rubber or linen cap being worn, but it may be rubbed with the moist hands during the treatment. Cold shower baths of *short* duration cause mild stimulation of the peripheral circulation and reflexly of the viscera. They increase blood-pressure and metabolism and are valuable in cases



Fig. 9. Simple Hot and Cold Shower-bath.

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Fig. 10. Perineal Douche

of general debility and anemia. They also prepare the patient for more vigorous measures.

Shower baths of longer duration (2-5 minutes) of *low* temperature cause intense reaction and withdrawal of heat, and are well borne after diaphoretic procedures—such as the wet and dry pack, Russian bath, electric-light bath or Turkish bath. They can only be administered to robust patients and act as an excellent hardening measure.

Hot shower baths act well where sedation and relaxation is striven for—in cases of chronic irritability of temper, insomnia and also in rheumatic and arthritic lesions. Excepting where sedation is striven for, these hot showers must always be followed by quick, cold ablutions.

A portable douche apparatus called the *ombrophor*, has been devised by *Winternitz* and *Gaertner*, and permits of various degrees of pressure and volume, and has its practical application where the patient cannot readily visit a sanitarium and must be treated at home.

Local douches are usually applied by means of the "*Faecher*" or fan douche—the stream being carried along the surface of a fan-like attachment of the nozzle, and producing an even, wide spray.

The *short*, cold fan douche applied over the neck, back and chest produces deep inspirations. On the abdomen, stimulation of the peristaltic wave is induced. It produces marked local and reflexly visceral stimulation and can be used to stimulate hepatic, gastric and splenic activity. If applied along the lumbo-sacral regions, sexual debility has been benefited. In neurasthenics with cerebral congestion, the fan douche to the soles of the feet acts very well, and is an able adjuvant to treading water or *short*, cold foot baths.

The local fan douche is contraindicated in acute inflammatory conditions of the respective viscera.

It must be remembered that the immediate stimulation and feeling of increased vigor induced by general or local douches is followed by a corresponding reaction, during which absolute rest is imperative. If treatment is resumed during the reactive period much harm may be done, and the patient weakened instead of stimulated.

Douches over the abdomen or other local treatments are well borne daily; full douches should be given every other day. Douching of the head must always be avoided, as the shock has been found harmful in many cases.

A "spray brush" made of rubber with small tubes of the same material covering same like the weave of plush, through which the water can be *sprayed* over a part while using friction at the same time, is a new device for home or sanitarium treatment for local douching plus friction. It is an excellent measure where superficial massage is desired, and with the thermic effects of hot or cold water, marked reaction can be induced by its use. In local myalgias, the alternate use of heat and cold with friction, by means of this perforated brush, has been found very useful. It is also excellent as a stimulant to the scalp, and lends itself readily for cleansing purposes, both local and general. (Figs. 11 and 12.)

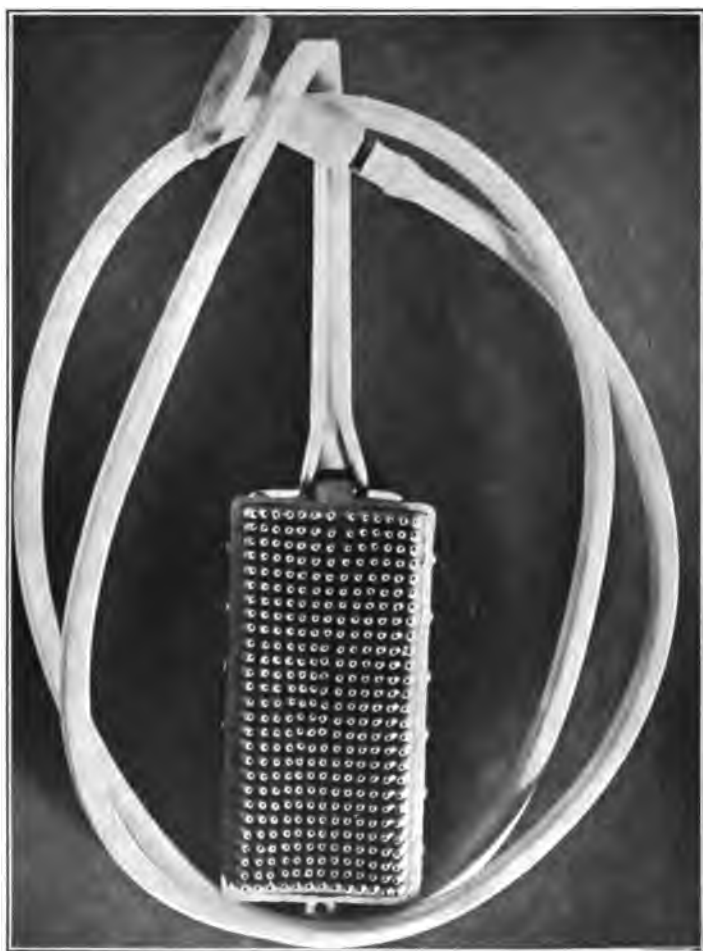


Fig. 11. The Spray and Massage Brush.

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Fig. 12. The Spray Brush in Operation.

CHAPTER XI

AFFUSIONS

Affusions have always been utilized as part of the technic in many hydrotherapeutic procedures. *Father Kneipp* applied affusions by means of a sprinkling pot, and his success in arthritis and rheumatism tended to popularize this special modality to a great extent.

Under the term *affusions* we comprise the pouring, dashing or sprinkling of water over parts of the anatomy of the patient, while he stands in a tub or basin or rests in bed upon a rubber sheet. The water may be applied by means of a sprinkling pot, in a fine or coarse stream, by means of a dipper, bucket or any other suitable vessel. The temperature of the water and the distance from which the water is poured, as well as the quantity of the water, is regulated according to the effect desired. In weak patients it is best to start with 80° and a mild stream, treatment lasting not over 3-5 minutes. The distance from patient and stream are increased and the temperature reduced as greater stimulation and reaction is desired. Cold affusions to the chest induce vigorous respiratory efforts and are valuable in pulmonary tuberculosis in the first and even second stage of the disease.

Hippocrates employed cold affusions in syncope and collapse; also in tetanus and convulsions.

Cold affusions (*Bauch-guss*) are employed as an adjuvant to the half-bath in constipation—the water being poured or dashed at regular intervals over the abdominal area.

Currie is reported to have cured a number of cases of typhus on shipboard by dashing pails of cold sea-water over the patients stretched upon deck, at intervals of one minute, until reaction set in.

In tetanus, affusions of cold water to the spine have been found useful. The ice bag is, however, more successful in this affection.

Affusions are sometimes the means of saving cases of meningitis. The child is placed in a hot half-bath and cold affusions are directed over the neck, spine and chest for 2 to 3 minutes, or until reaction takes place. The child is then dried and placed in a warm bed. If necessary, this process must be repeated *hourly* until improvement is manifested. Affusions also act well in cases of coma—the hot bath is followed by a number of quick, cold affusions to the spine with brisk rubbing.

Father Kneipp empirically ordered all cases of arthritis to be sprinkled with cold water at different intervals. The hyperemia induced by this active procedure undoubtedly produces secondary absorption and local improvement in circulation, and with it many cures of the underlying lesion. Lumbago and other forms of muscular rheumatism also respond to judicious application of this measure.

Hot affusions have marked action on the diaphoretic and eliminative property of the skin, and are useful as adjuvants in sapremia, puerperal fever and in ascites and anasarca. Hot affusions in sprains or injuries to joints or muscles act as analgesics and relax the tissues, producing prompt absorption. Hot affusions over the sciatic nerve also palliate many severe attacks of sciatica.

CHAPTER XII

ABLUTIONS

Abluting or washing off the body is performed by applying water by means of a rough linen cloth, coarse sponge or fine brush, or with the bare hands. Ablutions may be given local, sectional or general.

Local ablutions are indulged in daily instinctively by all civilized persons, excepting possibly the American genus tramp or the Russian moujik and the Hungarian gypsy. Ablution for hygienic purposes is, however, frequently improperly performed, many persons assuming that a quick, cold ablution is all that is required. This habit of washing, especially the face, with cold water, is a steady source of income to dermatologists and will readily be changed if the rationale of proper ablutions is explained.

The exposed parts of the body—face and hands—are, during the day, repositories for dust and grime, not to speak of bacteria; the body itself during rest at night has its sudoriparous and sebaceous gland outlets filled with their respective excretions. A cold application with its primary prolonged contractions tends to drive the dirt, grime, bacteria and products of waste back into the system and cause irritation or blocking of the outlets with resulting inflammatory changes.

If heat is applied, its prompt dilatation of the capillaries with induced hyperemia and relaxation of the glandular structures will cause a prompt excretion of the products of waste and dirt. Now, if this warm, cleansing process is followed by short, cold applications the stimulating tonicity of the cold is received, plus the cleansing qualities of the previous hot measure. This same principle is advocated in another chapter on baths given for hygienic purposes. Heat followed by short, cold ablutions, therefore, are the methods of choice for hygienic ablutions.

Short local ablutions of cold have a stimulating effect upon the skin and its peripheral blood-vessels and nerves, and when accompanied by *friction* this stimulation is increased and the interchange of caloric augmented, with secondary temporary increase of *local* temperature.

Short cold ablutions of the *chest*, performed with considerable rubbing, is markedly beneficial in pulmonary tuberculosis in all stages; they are also recommended for catarrhal tendencies of the bronchi, and act as a prophylactic to colds.

Short, cold ablutions of the testicles and perineum (Naturbad) in the male have been recommended as a general tonic when performed in addition to daily ablutions of the face, neck and chest when baths cannot be indulged in.

Short local ablutions of heat have a sedative, atonic and relaxing effect with secondary temporary diminution of *local temperature*. If friction accompanies the application of heat, stimulation of local circulation is accomplished also.

Alternate heat, followed by short, cold ablutions locally, has the result of producing primarily relaxation and dilatation with subsequent stimulation by the cold.

Sectional ablutions are a most useful procedure, especially as a preparatory measure to more vigorous treatments or as an active measure when the patient cannot be easily moved or bath tubs and other appliances are not at hand. The technic is as follows:

The patient is placed upon a sheet under which is a rubber cloth to catch the drippings. The clothing is removed from the parts to be treated or the patient is wrapped nude in a linen sheet. As is usual in all hydrotherapeutic measures, the face, neck and chest are first sponged with cold water and the parts to be treated are then successively exposed and sponged with the water (either *cold* or *hot*, depending on physiological or reciprocal effect desired). *Friction* or rubbing accompanies this sponging, which should consume about 1 minute for each section treated. The part is then dried and covered up to await reaction. It is customary to first ablate the *right* upper extremity, then the left upper extremity, then the chest, abdomen and lower extremities; then the patient is turned over and the back and shoulders are ablated. *This technic is repeated three times at each seance.*

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Fig. 13. First Stage of Sheet Ablution.

In giving the *cold* sectional ablutions the water is employed at 65° F. the first day and gradually lowered 2 degrees daily until 50° F. is reached. The action of the ablutions is enhanced by dashing water with the hollow hand over the parts after sponging and friction.

In giving the hot sectional ablutions the temperature of the water is taken at 105° F. and gradually increased to 120° F. After each hot sectional abluion the parts are quickly sponged over with cold water to restore the tonicity of the circulation of the skin and sweat glands and to stimulate the peripheral nerves, excepting where *sedation* is desired when the *cold must be omitted*. After the process is finished the sheet and rubber cloth are withdrawn by rolling the patient to one side, and the patient is then well covered to secure reaction.

A modification of the simple sponging with friction consists of taking two pieces of linen cloth and preparing two receptacles of water (either hot or cold, depending on the modality employed). The cloths are rinsed in the water, and one cloth is wrapped *alternately* over or around the sections treated as described above and vigorous friction employed over the cloths for from 1-2 minutes—the second cloth is always steeping in the second receptacle (the temperature of the water of which is *kept as stationary as possible*), having previously been washed in the first receptacle. In giving the cold sectional ablutions the operators expect to see the pad steam after the friction if proper reaction is secured. The action of cold sectional ablutions tends to stimulate peripheral circulation, thus relieving the heart. It also produces increased activity of the skin and sweat glands, increasing the excretion of urea, carbon dioxide and other effete derivatives. It also increases the depth and force of the respiratory act in a decided manner and physically abstracts heat, thus reducing bodily temperature to some extent. The reflex stimulating effect on the nervous system is very marked and is considered by some hydrotherapeutists to be of the greatest value of all above actions.

Hot sectional ablutions have been employed by the writer in bacterial and auto-toxemias. Increased activity of the sweat glands is induced with marked increase of elimination and, para-

doxical as it may appear, diminution of temperature of greater degree is frequently secured by this measure if employed *lege artis*, than by the cold sectional ablutions. We employ it particularly in diseases where the functional activity of the skin is inhibited to some extent, as in the exanthemata—also in cases where *sedation* is striven for; in the latter cases the friction or rubbing must be superficial, a mild stroke being employed.

It is well to bear sectional ablutions in mind in all cases where patients are afraid of water—the beneficial results of the procedure will promptly secure the confidence of the patient and gradually more vigorous applications of water can be interposed, as indicated.

They are also indispensable where bath tubs and other appliances are not accessible, as in the country or in the country-homes, while camping, etc.

When the patient is so weak that he cannot be moved or is too stout for easy transportation, and in all other emergencies, hydrothermic agencies can be safely and successfully employed by means of properly conducted ablutions.

General or complete ablutions are employed as a forerunner of more vigorous measures in many sanatoria. The technic follows (Figs. 13 and 14):

With the patient prepared, he stands in a basin or tub of water of 100° F., up to the malleoli, and is rapidly ablated with water at the given temperature. When cold water is indicated the temperature is started the first day at 80° F., and gradually reduced daily until 50° F. is reached. In hot ablutions, water at 105°–120° F. is employed. During the ablation—with sponge or cloth—water is poured over the parts ablated from a dipper, and gentle rubbing is indulged in. In plethoric persons the massage should be away from the heart; in anemic persons toward the heart. The process should consume *ten minutes* and must be performed in a warm room with no draughts, and the patient rested after the treatment. A modification of simple sponging or abluting with a cloth consists of the *sheet-ablution*, the German “*Abstreifung*” or “*abklatschung*.” A large linen sheet is soaked and rinsed in water of desired temperature, and with the patient properly prepared, his feet are placed in a small tub of



Fig. 14. Second Stage of Sheet Ablution. Active Rubbing and Stroking of the Parts Accompanies the Moist Enveloping of the Patient.

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Fig. 15. Full Pack. First Stage.

water at 100° F., to reach the malleoli—the arms are raised above the head. The attendant then quickly takes one end of the moist cloth, places it under the right armpit of the patient, who holds it by lowering his right arm, the cloth is then carried over the chest to the left arm-pit, the patient again holding this portion by lowering the left arm; the cloth is then carried around the back, over the right and left shoulders, several turns being made, and the tip being wound around the neck and fastened by tucking same in.

The lower sheet is wrapped around the trunk simultaneously with the upper extremity, and each lower extremity is wrapped separately from each side. This is performed more quickly than it takes to write it. The attendants—preferably two—now begin to rub or stroke the whole body vigorously with the palms of their hands, using long strokes until reaction or steaming of the body sets in, the whole process requiring from 2–3 minutes. Invalids who cannot stand and children are rubbed in a recumbent position, with the bed or couch prepared as in sectional ablutions. After the rubbing the patient is dried, and holds the two ends of a dry sheet between his arm-pits, the attendant agitating or shaking the loose ends for a few minutes, thus giving the patient a short, stimulating air bath. When these sheet baths are given for stimulating purposes (cold) a brisk walk after dressing tends to produce good reaction. When given for purposes of relieving toxemia or producing sedation or in fevers, rest in bed is enjoined. The degree of massage can be modified from a mild rubbing to strong slapping of the parts of the body (*Abklatschung*), and the reaction is accordingly mild or vigorous. It is desirable, as a rule, to induce the patient to co-operate with the attendant and rub his own body after the removal of the wet sheet.

Repetition of all these varieties of ablutions depends on the case; as a rule, in hyperpyrexia and toxemias, sectional ablu-tion seances (*three times* at one treatment) are repeated three times daily. Complete ablutions are administered twice daily.

CHAPTER XIII

PACKS, COMPRESSES, BANDAGES AND FOMENTS

Packs may be either dry or moist. The latter may be hot or cold. (Figs. 15, 16 and 17.)

The Dry Pack

The simple dry pack was the original *Priessnitz* preparation for diaphoresis with subsequent cold, full bath.

The patient is prepared as usual (special care being taken to be sure to have the bladder emptied) and in a nude condition is placed in a recumbent position, on a few layers of coarse woollen blankets which are promptly folded over his body—the first fold is pulled firmly about the trunk and shoulders, the second folds over the first, the tip being tucked in around the neck. The lower extremities are each wrapped up separately, and the lower ends of the blankets are turned over the parts so as to have an abundance of covering over the feet. Sometimes a hot water-bottle is placed inside of the blankets against the soles of the feet to produce quicker reaction. A hot beverage increases the tendency to perspiration, and should not be forgotten as part of the technic. Thus wrapped up the patient remains at rest in a well-ventilated warmed room for from one-half to one hour, or until perspiration is well established. Where patients do not perspire readily, the *cold compress* about the head is *not applied*, but as a rule, the cold turban is found useful to prevent cerebral congestion. When the patient has perspired the required time, he is quickly either abluted with cold water, or, if the full bath is prescribed, quickly immersed for 30 seconds to 1 minute in a cold full bath, then quickly dried and placed in bed to await reaction. In most cases the patient soon falls into a refreshing sleep, after which his symptoms generally show improvement.

This pack, with its subsequent cold, full bath, is one of the most powerful agents for producing reaction, and must not be



Fig. 16. Full Pack. Second Stage.

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Fig. 17. Three-quarter Pack. First Stage.

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applied indiscriminately. It is usually interposed when milder measures do not act favorably or in cases where reaction is sluggish or absent. Repetition of same requires good judgment; as a rule during chronic diseases every other day or twice a week is sufficient. In acute conditions, *one pack*, followed by half or full baths or other indicated treatments, is usually sufficient to bring about vigorous reaction.

The dry pack is a favorite method for the treatment of excessive obesity, and if *diet* is carefully observed the reduction in weight is progressive. In these cases of polysarcia the subsequent cold, full bath is extended for some minutes with two or three attendants rubbing the patient vigorously while in the bath. The loss of weight is progressive if the treatment is given daily, about *ten pounds per week* being lost in a case under our observation. On Sundays when the treatment was omitted and the patient usually indulged his appetite in spite of instructions to the contrary, a moderate increase of weight would again be registered.

In tertiary syphilis and mercurialism, the dry pack with subsequent cold ablutions, is of great value as an eliminant, and in chronic arthritis and gout very good results have been achieved by its use.

Contraindications for the dry pack are marked arterio-sclerosis, cardiac lesions or weakness, neurasthenia if of long standing, and chronic cases of diabetes.

The *moist pack* is most frequently employed cold, although hot, moist packs have distinct and valuable therapeutic indications.

The Cold, Moist Pack

The patient is prepared as in the dry pack, excepting that a moist linen sheet, thoroughly soaked and slightly rinsed in the prescribed temperature (50°–65° F.), is placed on top of the layer of blankets. This wet sheet is firmly and closely wrapped about the body, the first layer being brought around the chest and trunk with the arms elevated, and these are then brought down and the second fold is closely wrapped over the arms and tucked in at the neck. The lower extremities are wrapped up separately with each fold, and the surplus cloth is folded under

the feet. The blankets are then quickly folded about the patient and a heavy quilt or feather bed placed over the blankets. The blankets must be firmly tucked in at the neck and folded evenly under the feet.

In all cases it is best for the physician to remain in the room during the first treatment of this kind, for the patient frequently becomes irritable and intractable and nervous when left alone and confined in this manner; at all events a nurse or member of the family should remain in the room in case of emergency. The presence of others in the room quiets the patient's fears and acts suggestively through their calm behavior.

The duration of the *cold, moist* pack is from 10 minutes to one hour, depending on the reaction. The cloth about the patient should be *hot and dry* before the blankets are removed, and the patient is immediately abluted or bathed in cold water and friction of the skin indulged in at the same time. These cold, moist packs are repeated in hyperpyrexia, three times daily; in some cases ten packs a day are given. Rest is enjoined *after* each treatment.

The Hot, Moist Pack : The Hot Blanket Pack

The *hot, moist* pack is prepared like the cold, moist pack, excepting that the linen cloth or blanket is steeped and slightly rinsed in hot water (110°–130° F.) and the patient quickly wrapped up and covered, this being performed as expeditiously as possible to prevent radiation of heat. Perspiration is quickly induced by this method and elimination through the skin increased to an enormous extent.

The indications for the *cold, moist* pack of short duration point to *pyrexia*, in which the reaction is secured in from 10–30 minutes; also to cases of neurasthenia, exophthalmic goiter, flushes of heat at the menopause and idiopathic hemicrania. In the latter type of cases the patient remains in the pack from 20 minutes to 40 minutes. The moist pack of short duration quiets the pulse and relieves internal congestion, and if followed by the usual cold ablution or bath causes improvement in elimination, lowering of temperature and quieting of the nervous system.

If the moist, cold pack is prolonged to one or two hours marked hyperemia of the skin is induced with increase of the pulse rate and marked diaphoresis. These prolonged moist packs are indicated in chronic joint and muscular rheumatism, in gout, in chronic neuralgia and in obesity.

The hot, moist pack is indicated in cases of nephritis, as a substitute for hot half baths, but is not as a rule preferred to same for the interstitial or catarrhal type of nephritis. In croupous or parenchymatous nephritis the hot pack is invaluable for its eliminative stimulation of the skin. In coma the hot pack, especially the blanket pack, is an indispensable adjuvant, and in cerebro-spinal meningitis we have had two cases under our observation respond favorably, *after repeated hot packs*, with subsequent cold ablutions and affusions to the spine. In delirium tremens, when the hot bath is not readily given, the hot pack acts well, the patient usually quieting down after 30 minutes to one hour and falling into a quiet sleep.

The hot blanket pack is preferred to the hot linen pack when it is desirable to secure *prolonged action of heat*, as it retains its temperature for some time.

Contraindications for moist packs are cardiac lesions, advanced pulmonary tuberculosis, aneurism of the aorta, marked arterio-sclerosis and all conditions of marked debility.

COMPRESSES, FOMENTS AND BANDAGES

Compresses, fomentations and bandages are employed for the application of moist cold and heat to circumscribed areas of the body or to localize the effects of these modalities.

Soft cotton, and preferably linen cloths, are soaked in water and folded a number of times and smoothly spread over the parts to be treated, being covered by dry cloths or flannels to keep them in place and secure reaction. Oiled silk is frequently placed over these moist cloths to prevent too rapid radiation of heat and to obviate too frequent change of the compresses.

The cold compress, also called the "*Priessnitz Umschlag*, or Bandage," is composed of at least four or six layers of linen over which are placed dry portions of the same cloth or a piece

of flannel. It is employed for its stimulating properties, and when thus intended it is changed every 20–30 minutes or until the moist, cold compress becomes warm and slightly dried. It acts as an antiphlogistic agent, causing active hyperemia in the tissues to which it is applied, influencing the local circulation to more rapid flow and also increasing locally the leucocytes and erythrocytes. The blood corpuscles are most numerous around the periphery of the application. Cold applications locally also affect the peripheral nerves and reflexly the central and vasomotor nerves. The relief of tachycardia, for instance, through application of cold over the cardiac area, can be explained on no other principle.

The blood-stream can also be *reflexly* influenced through cold applications—and congestions at a distance relieved. Thus the application of cold compresses about the calves or thighs relieves active congestion of head; the application of the cold, wet stocking, the latter well-covered by heavy cloths or toweling, relieves engorged turbinates and congestion of the nose and throat.

The cold, moist compress is, therefore, indicated in congestions, active inflammations, exudations, swellings and hyperemias accompanied by heat and pain. To accomplish reaction the compress must not be changed *too often*, the rule to change them half hourly being a safe one. If the bandage is changed every few minutes the effects of *prolonged cold* is induced (inhibition and analgesia), as will be further dilated upon under the caption of Ice Bags. In beginning severe inflammations these *inhibitive* cold compresses are indicated, *being renewed every few minutes*; they are nearly always followed by the *stimulating compress*, renewed every 20–30 minutes.

Hot compresses are arranged by steeping the cloths in very hot water, 130°–150° F., and wringing out the excess of water by placing same in a towel and twisting both ends of the latter so as to squeeze out the excess moisture. In order to prevent injury to the skin, it is advisable to anoint the parts to be treated with vaseline or olive oil previous to the application. Hot applications are renewed hourly as a rule; in some cases more frequently; if they are covered with layers of oiled silk, the hot temperature is kept more even.

Hot compresses produce analgesic effects, especially in non-inflammatory cases (colic and neuralgia); they relieve spasm and produce absorption of serous and purulent exudates. They cause loss of tonicity of local circulation and consequent relaxation, and are, therefore, indicated in contractions, spasms, colic, sprains, cramps, neuralgias, congestions of a non-inflammatory character, and in all cases where increased local metabolism is desired. The application of the hot compress over the pubis and perineum to relax the uterine tissues or the bladder is a well-known obstetrical procedure.

Alternating Cold and Hot Compresses are indicated where marked improvement in local circulation is striven for. The hot compress is applied for 3 minutes, followed by the cold compress for 1 minute, this being repeated three or four times during one hour, when reaction is awaited. This technic is repeated every 3 hours when necessary.

Compresses or bandages are applied in various ways for different parts of the body. Thus we have the head compress and turban, the neck compress or bandage, the triangular bronchial compress, the chest compress or cross-bandage, also called Scotch compress, the trunk bandage, the abdominal bandage or Neptune's girdle, the hemorrhoidal or genital T bandage, the joint compresses or bandages, the foot bandage and the wet stocking.

I. The Head Bandage or Turban

The head bandage or turban is usually employed cold.

The cloth is moistened in cold water and wound about the forehead several times and the surplus cloth folded over the rest of the head and fastened. A heavy linen cap may be substituted for the layers of cloth. These bandages or caps must be changed and remoistened *very frequently* if the object of the cold turban is to *prevent reaction*. Ice bags or coils may also be substituted in these cases. Where such inhibition is desired, the cold head bandage is indicated in all congestions of the head, in apoplexy, in all inflammatory conditions of the meninges and in congestive cerebral neuralgia. Its application to prevent

cerebral congestion in all active hydriatric procedures has been touched upon at various times.

In ambulant cases, when the bandage is removed, the head is dried and the patient cautioned not to expose himself to changes of temperature for an hour or more.

Cold compresses applied for stimulating purposes *must not* be renewed, excepting when warm and dry, as reaction is desired in these cases.

The stimulating cold compress consists of a number of folds of linen covered by oiled silk or flannel and renewed about every 30 minutes. Indications for its use are anemic conditions of the brain and meninges with headaches and neuralgias due to this basic cause; in atonic chronic rhinitis, pallor of the face and in some cases of facial neuralgia.

Hot bandages about the head are applied as already described in the technic on compresses, and are changed hourly. They are indicated in headaches due to spasm or contractions or neuralgias with similar basic cause.

II. The Neck Compress or Bandage

A linen cloth, 24 inches long by 16 inches wide, is folded four times so as to give a 4-inch bandage, 2 feet long. In domestic practice an old, well-worn large napkin does splendid service in lieu of regular linen bandages.

The cold bandage at this portion of the anatomy is wound about the neck, covered with oiled silk or flannel, and firmly fastened. A modification recommended by *Professor Baruch* in cases of tonsillitis and parotiditis, consists in bringing the bandage upward from the chin over the ears and fastening same over the head. A slit is made in the cloth at the location of the ears and the ears protruded through it. This holds the bandage in place and brings the cold in contact with the tissues adjacent to the tonsils or parotid gland. In the ordinary neck-bandage the tonsils are often outside of the direct sphere of influence. (Fig. 18.)

The cold neck bandage *frequently renewed* is indicated in hyperemia, congestions and inflammatory conditions of the

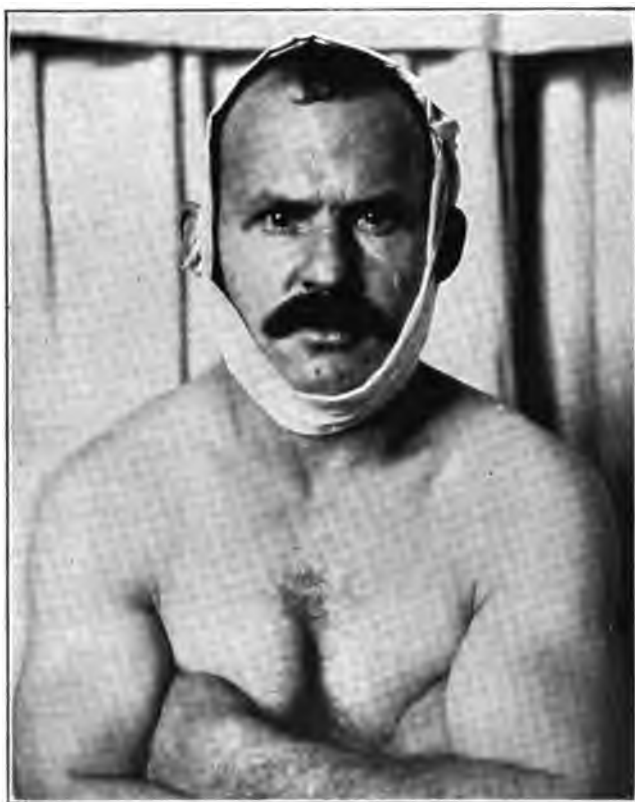


Fig. 18. Neck Compress. Particularly Adapted for Tonsilitis and Parotiditis.

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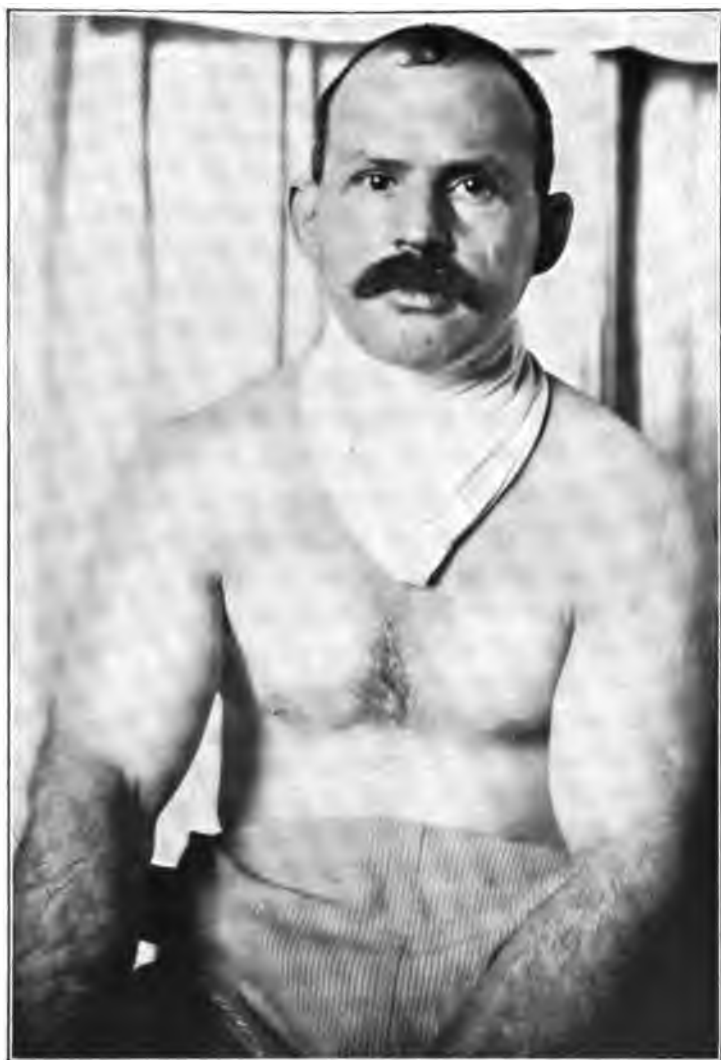


Fig. 19. Triangular Bronchial Compress.

anatomical structures it encompasses, such as in tonsillitis, pharyngitis, laryngitis, diphtheria, croup, adenitis, rubella, etc. If frequently renewed, every 2 minutes, inhibition of inflammation is secured, and if followed by *stimulating* bandages—renewed every 30 minutes—resolution is hurried.

Stimulating bandages improve local circulation, increase elimination, assist the discharge of catarrhal and membranous exudates and improve the local nerve function and reflexly the more remote central nervous system.

Hot neck compresses or bandages are indicated where absorption is required; also where stasis is due to contractions or spasms of blood-vessels. In marked angina, edema glottidis and in anginous diphtheria the hot compress does good service. It must be renewed every 30 minutes to one hour, depending on reaction.

Hot neck bandages also relieve headaches of anemic origin, also the headaches coincident with menstruation in anemic patients.

Cold neck bandages, if *frequently* renewed, every 2–3 minutes, reflexly relieve congestive headaches, and also act well in hay-fever and meningitis.

III. The Triangular Bronchial Compress (Fig. 19)

A piece of linen cloth or soft old towel, 18–20 inches wide and 36 inches long, is first folded double and then folded crosswise so as to form a triangle. The compress is applied usually as a stimulating compress—cold, covered with flannel and renewed every 30 minutes, or when applied on retiring at night also covered with oiled silk—for bronchial inflammations, croup, and also in broncho-pneumonia. In acute severe inflammations the compress is changed every 2 minutes for 2–3 hours, then the stimulating compress is applied as directed above. Alternate hot and cold triangular compresses are the author's favorite hydiatric treatment in broncho-pneumonia. Expectoration is made easy, the cough diminishes and pyrexia is lowered.

Instructions in non-complicated cases are to renew the compress *alternately* every 30 minutes.

IV. The Chest Compress and Cross Bandages, also Called the Scotch Compress (Kreuz-binde)

Simple chest compresses are usually applied cold, the folded linen sheet or cloth covering both anterior and posterior aspects of the thorax with warm flannel covering or blankets firmly fastened about them. A modification consists of a garment made of sheets of linen cut like a vest which fits snugly about the thorax. The chest compress can be localized over the cardiac area (tachycardia, valvular lesions) or over either the right or left lungs, depending on the lesion to be influenced.

The Cross bandage or Scotch compress or Cloak is the best appliance for influencing thoracic innervation and circulation.

The linen toweling required for this bandage consists of two sections, each 3 yards long, and when folded 10 to 12 inches wide. The two bandages are well moistened, and starting at the patient's right axilla and covering the thorax, the cloth is carried over the left shoulder, then diagonally across the back to the place of beginning; then the bandage is carried across the chest (after passing through the right axilla) and through the left axilla to the back; then across the back to the *right* shoulder and over the right shoulder to the chest and then a circular turn over the rest of the bandages over the chest and back. This bandage is covered with a close-fitting sweater or heavy blanket. (Figs. 20, 21 and 22.)

The advantage of the cross bandage lies in the fact that all portions of the lung are brought under its influence—the apices especially are covered, while in the usual chest compress they are not reached. The instructions usually given are to change the cross bandages every 30 minutes or until same are fairly dry and warm. If reaction is poor, they must not be renewed quite so often. The patient is usually not disturbed during the night, when the bandage is renewed before retiring. To retain the temperature as evenly as possible layers of oiled silk are placed between the moist cloths and the blankets. During the day the oiled silk is not as essential as during the night. When the patient is exhausted or very weak it is frequently *necessary to*



Fig. 20. First Stage, Chest Compress or Cross-bandage.

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Fig. 21. Second Stage, Chest Compress or Cross-bandage.

moisten the bandage in situ, by means of wet sponges, as the handling and moving of the patient entails some exertion, and is not well borne. Ordinarily, however, the change of position and moving of the body is beneficial to the patient.

In emergencies or complications where *inhibition* and cooling is desired (hemorrhages, severe pleurisy), an ice bag or cold compress *frequently* renewed (2 minutes) may be interposed *locally* at any station; in hemorrhages the subclavicular region is preferred. This intervention need not disturb the renewal or application of the cross bandage itself.

Coincident with cross bandages or independently, the heart muscle can also be treated, as already briefly mentioned.

Application of cold over the cardiac area increases arterial tension and blood pressure, diminishes the pulse rate and diminishes tachycardia and arrhythmia, thus generally stimulating cardiac tone. We will revert to the action of cold and heat on the heart when speaking of coils, ice bags and hot water bags.

The *stimulating* cross-bandage (renewed every 30 minutes) is one of the most important adjuvants in the treatment of bronchial, pleuritic and pulmonary diseases. If properly applied and renewed, it modifies the cough, facilitates expectoration, relieves dyspnoea and oppression of breathing, improves thoracic circulation and increases elimination.

Catarrhal bronchitis, asthma, bronchiectasis, emphysema, broncho-pneumonia, lobar-pneumonia, influenza, pneumonia, pulmonary tuberculosis and phthisis and pleurisy can all be influenced, depending on the symptoms encountered, details of treatment being reserved for the therapeutic chapters.

In acute pleuritis the additional *inhibitive* frequently renewed (2 minutes) bandage may be interposed. This same measure is utilized in acute pericarditis, myocarditis and endocarditis also.

Hot thoracic compresses (120°–130° F.) repeated half hourly produce a relaxing and sedative action on the thorax and its contents. They also produce absorption of exudates and infiltrations. They will be thought of in angina pectoris, chronic bronchitis, edema and abscesses of the lungs and chronic adhesive pleuritis and also in asthma of nervous origin and in intercostal neuralgias.

After hot applications a short, cold ablution is indicated to restore tonicity to local circulation.

V. Trunk Bandage

The folded bandages must be wide enough to reach from the symphysis pubis to the axilla, 10-16 inches, and must be sufficiently long to surround the trunk with a strip to spare—60 to 70 inches.

The bed is prepared similar to the moist pack, the moist bandage being *in situ* over a second dry cloth, which should extend two inches above and below the moist cloth. The patient in a nude state is quickly placed upon the bed or couch, as thus prepared, and the moist, followed by the dry cloth and blankets firmly envelops the *trunk*, and the rest of the body is covered with warm blankets. The cold *stimulating* trunk bandage is renewed every 3-4 hours, or whenever it becomes hot; the cold *inhibitive* trunk bandage is renewed *half hourly* and acts *antipyretically* by abstracting heat to a marked degree.

When changing the cold cloth in non-ambulant cases the patient is rolled to one side and the fresh, moist cloth spread over the dry cloth underneath, and the patient quickly rolled back into place and the cloth enveloped about his trunk.

Hot trunk bandages are applied as above with the change of temperature of the water (120°-130° F.), and are changed half hourly or hourly.

They relieve spasm, gastralgia, gall-stone colic, intestinal colic and reflexly act well in uterine colic and dysmenorrhea. They also increase absorption of chronic exudates.

The *cold, inhibitive* trunk compress is indicated as a preliminary measure in severe inflammatory lesions of the abdomen and pelvis (stomach, intestines, liver, pancreas, spleen and peritoneum) and in hemorrhages from the same organs. Ice bags may be locally interposed to intensify the action.

The cold, *stimulating* trunk compress is indicated in chronic, hyperemic conditions of the abdominal and pelvic viscera. In acute gastric and intestinal catarrh they assist resolution and *reflexly* they act well in insomnia and hyperirritability of nerves.



Fig. 22. Third Stage, Cross-bandage.

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Fig. 23. The Abdominal Bandage, or Neptune's Girdle.

The Pelvic Pack

A modification of the trunk bandage is the *pelvic bandage or pack*. This is applied when we desire to localize the action of heat or cold in the pelvic region, and the action is similar to sitz baths, to which we refer. Hot pelvic packs alternated with cold pelvic packs act well in peritonitis and other inflammatory conditions of the pelvis; the technic consisting in applying a hot, moist linen cloth from the crest of the ilium to the folds of the buttocks, enveloping the parts in blankets and changing three times in one hour. Then the stimulating *cold pelvic pack* is applied for 30 minutes—and this alternation may continue for 24 hours or longer, until improvement in symptoms is achieved.

VI. Abdominal Bandage or Neptune's Girdle (Figs. 23 and 24)

The abdominal bandage (*Leib-binde*) was one of *Priessnitz's* favorite measures for influencing the abdomen and its viscera as well as reflexly affecting distant organs and gently stimulating nerve function. It also acts as a mild antipyretic.

The typical *Priessnitz* bandage is 10–15 inches wide and 3 yards long, with tapes fastened to one end. About 3–4 feet of the bandage is soaked in cold water and wound about the abdomen from the crest of the ilium upward, including, as a rule, the diaphragm, and the dry portion covers the moist part and is tied with the tape. A modification of same in common use consists in taking a moist linen cloth, rinsed in water of 50°–60° F., folded double so as to be 10–15 inches wide and encompassing the same area as above. This moist cloth is covered with flannel cloth cut two to three inches *wider* than the wet cloth, and the fastening is done with tapes or safety pins.

In chronic cases, as an adjuvant, it is applied in the evening on retiring, and the parts covered are on arising vigorously abluted with cold water. It may also be worn in ambulant cases during the day when the weather is not too cold, and in such cases is changed every three hours, or when it becomes warm.

It is a splendid adjuvant to apply after banquets or dietetic excesses, also reflexly to relieve cerebral congestion.

The author, on *Doctor Kuhn's* recommendation, has applied the abdominal bandage as an adjuvant in typhoid and other fevers involving the abdominal organs. In typhoid fever, it is worn between baths or ablutions and is changed every 30 minutes or until dry and warm. Through reflex action and its stimulating action on the diaphragm, this measure obviates hypostatic pneumonia, which frequently complicates typhoid fever—it also stimulates intestinal circulation and thus hurries resolution. The action of reflexly stimulating the nervous system and quieting cerebral circulation has already been touched upon.

Professor Baruch recommends its continual employment in recurring appendicitis or as a prophylactic to such recurrence. For individuals who lead an active life, the time of application would perforce be on retiring, with a brisk, cold ablution of the parts on arising in the morning.

It has indications in most acute and chronic gastric and intestinal lesions, constipation, flatulence, in hyperemia of the liver and spleen, in hemorrhoids, and in amenorrhea—in the latter condition it produces marked genital reflex stimulation. For the latter reason the abdominal bandage must be avoided where there is sexual hyperirritability, prostaticorrhea, priapism, etc.

VII. Hemorrhoidal or Genital T Bandage

The T bandage is composed of two parts of linen cloth, the upper or abdominal portion being 8–10 inches wide, to which in its center is sewed or pinned one end of a narrower strip of *padded or folded linen cloth*, 2–3 inches wide, to encompass the genitals and rectum. The abdominal portion is usually 2 yards long, the genital portions 24–30 inches long. (Fig. 25.)

With the dry abdominal portion firmly fastened just above the crest of the ilium, the genital portion, reinforced with layers of gauze, is soaked in cold water, fastened in front to the abdominal portion and quickly carried over the genitals through the thighs and fastened on posteriorly.

When reapplied frequently (every 10–15 minutes) the cold T bandage acts well in proctitis, periproctitis, prolapsus of the



Fig. 24. The Abdominal Bandage *in situ*.

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Fig. 25. The Genital or T Bandage.

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rectum, inflammation of the anus and scrotum, prostatitis, inflammatory hemorrhoids, orchitis and epididymitis.

When applied cold and renewed *every hour* or until dry over night, chronic genital and rectal lesions are benefited—including prostatitis, gleet, chronic hemorrhoids, chronic orchitis and epididymitis.

Hot T bandages are beneficial in spasms and tenesmus and in certain hemorrhoidal conditions when contraction and spasm produce much discomfort. They are steeped in hot water (120°–140° F.) and renewed half hourly until sedation is secured. Sphinctero-spasm, tenesmus of the rectum, tenesmus of the bladder, vaginismus and chordee are benefited by this measure. The genital portion of the T bandage is usually reinforced by sufficient layers of gauze so as to render close approximation easy. By means of these T bandages the sympathetic system (through the numerous local plexuses of nerves) can be readily stimulated (cold, stimulating compresses), or sedation can be striven for by means of warm or hot applications.

VIII. Joint Compresses or Bandages (Longettes of Winternitz)

These consist of pieces of soft linen from 2–4 inches wide and 18–36 inches long, which are in the form of a spiral or spica bandage applied over respective joints.

The cold inhibitive bandage is fastened about the part to be treated, and lightly covered in flannel or blankets. As it is very painful to the patient to remove this bandage in acute joint lesions (where it is particularly applicable) the covering is usually raised and the original bandage at frequent intervals *sprinkled with cold water* so as to keep the cloth continuously cold.

When employed for stimulating purposes the bandage is fastened and firmly covered with soft flannel or lint, and a blanket or cloth placed over the whole. These stimulating bandages are changed when warm and dry—30 minutes to 1, sometimes 2 hours, depending on the case.

Hot joint compresses are applied in sprains, contractures, chronic joint rheumatism and gout. They are applied with

water at 120°–130° F., using very soft cloths or gauze, or in some cases absorbent cotton, and must not be changed too often—usually from 6–10 hours. To avoid injury to the skin the parts are anointed with vaseline or olive oil *before* each application.

The cold *inhibitive* joint bandage is indicated in acute articular inflammation as well as ulcerations and scaldings. When the acute inflammation has subsided, the *stimulating* bandage is advisable.

The *stimulating* bandage is a favorite measure in sub-acute or chronic arthritis with associated local stasis.

IX. The Foot Compress and Wet Stocking

For acute inflammatory conditions of the tarsus, cold *frequently moistened* bandages are indicated; the pain of pes-planus, periostitis and deformities of the foot are benefited. The bandage, when in place, need not be removed but can be soaked or immersed at frequent intervals in a vessel containing cold water, or when this is not practical the water can be sprinkled or dripped over the original bandage.

The *stimulating cold* foot bandage is indicated to improve nutrition of the parts, and should be remoistened when warm, every 2–3 hours.

The wet stocking consists of a pair of soft linen or woollen stockings reaching above the malleoli, which are immersed in cold water and placed on *both feet* and covered warmly, first with a dry cloth and then with flannels, Turkish towels or blanketings. They are the author's favorite treatment in acute coryza, especially in engorged turbinates and in congestion of the brain after excessive mental strain.

The application is generally made *at night*, and the stockings remain *in situ* until morning, when the feet are abluted and rubbed with cold water after removal of the stockings.

In the distressing condition of *engorged* and *hypertrophied turbinates* this measure acts like magic. The reflex circulatory action takes place within an hour or two and the patient who was in distress through compulsory mouth-breathing, through clogging of the nasal passages, is soon relieved of the engorgement

and drops into quiet sleep. For hyperhydrosis of the feet, the same agent acts favorably.

The *hot, wet stocking* has been employed for callosities of the feet, neuralgias referable to the tarsus and spastic conditions of the foot and toes. The hot stockings are changed every two or three hours, and the feet are anointed with vaseline and gently rubbed with each change.

CHAPTER XIV

ICE BAGS, ICE COMPRESSES, COILS AND TUBES

Ice bags are usually made of rubber or cravenette material, and may be round or square and of different sizes to meet various uses. Modifications of the ordinary ice bag are the compartment ice bags and the so-called *Chapman* ice bags (Fig. 26), the former being made up in compartments to hold individual small blocks of ice (to prevent irritation through motion and with it loss of position), the latter being sets of elongated ice bags with compartments separated from one another in the center by indentated pieces of plain rubber and having attachments for fastening about the joints or body.

Ice bags should be filled with small pieces of ice of possibly even size, and should not be applied to the skin *direct*, but have a thin piece of soft cotton or linen cloth interposed. They should be renewed half hourly. Where intense action is desired (as in freezing tissues for minor operations) one part of rock salt to two parts of cracked ice may be filled in the bag. Therapeutically such intense degrees of cold will not be employed excepting where emergencies demand inhibition of the most intense kind.

Another modification, the ice collar, consists of a circular tubing of rubber into which the ice may be placed—it is particularly applicable around the neck and about joints.

Ice compresses made by using at least six folds of soft gauze rinsed in ice water or cooled on blocks of ice, are also useful procedures. They are used over irregular portions of the body, about joints, about the clavicle, eyes, nose, etc. They must be renewed every *minute*, a number of compresses being cooled ready for use while others are being applied.

Ice applied through the medium of ice bags, collars or compresses, exerts the following physiological effect:

It is antipyretic, hemostatic, antiphlogistic and analgesic. Its



Fig. 26. 1. Chapman Ice-bag. 2. Screw-top Ice-bag.

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analgesic effect is best displayed in inflammatory states, in non-inflammatory conditions *heat* acts more promptly.

Prolonged applications of ice produce reflexly changes in the circulation of distant parts—excessive cooling causes contraction of blood-vessels to which it is applied with induced hyperemia of related or collateral vessels. Ice not only cools the *circulation directly* but can influence tissues situated some distance from where it is applied. Care must be taken in its use to renew the application of the ice bag every 30 minutes and give the parts a quick ablution with tepid water to restore tone as vital action may be inhibited, which, if continued, will produce blebs or even necrosis of tissue. The first application causes blanching—anemia of the skin—if this is continued the skin becomes blue, due to excess of CO_2 and lack of oxygen in tissues. This stage must not be permitted to continue too long as necrosis is imminent. Apply stimulating compresses with mild friction to restore the tonicity of the blood-vessels.

The application of ice therapeutically is manifold. *Doctor Chapman* was an enthusiast in its use, and *Doctor Kellogg** employs it as an adjuvant in many conditions.

Starting with the *head*, we find ice bags indicated for *short* applications in congestive headaches, delirium and cerebral excitement. *Continued cold* is utilized to contract blood-vessels in apoplexy of the brain and spinal cord. In meningeal inflammations, ice acts inhibitive and anti-pyretically. Ice compresses act well in ophthalmia neonatorum, gonorrheal ophthalmia, and in other inflammatory states of the eye.

Epistaxis is checked by applying ice to the cervical spine or ice compresses over the nose itself. In alveolar inflammation, and toothache of inflammatory etiology, ice applied directly over the affected area or reflexly over the cervical region of the affected side relieves the pain. If neuralgic in character *heat* is to be preferred. If the etiology is doubtful, alternate *ice* followed by *heat* acts well.

Doctor Kellogg recommends the ice collar as a valuable aid in diphtheria—the application is changed every 15–20 minutes and is followed by a short, *very hot* foment after each change.

* Rational Hydrotherapy

Ice applied to the nape of the neck stimulates the respiratory center—this center is also stimulated by applications of ice to the lips and nose. This measure is utilized in asphyxia or narcosis from chloroform, ether, morphine, cocaine and other narcotics.

Prolonged applications of ice to the back of the head is valuable in spermatorrhea, and prostaticorrhea, acting inhibitory on the sexual sphere. *Short* applications of ice *stimulate* the parts. The prolonged application is made on retiring by resting the base of the skull on a well-filled bag of ice which is broken up finely and may be mixed with a small amount of rock salt.

Vaginismus and masturbation of women, due to sexual erethism, finds relief through the use of the ice bag applied to the upper cervical region for 20 minutes several times daily.

Anemic headache reacts favorably to ice bags applied to the cervical region for 1-3 minutes.

Nervous asthma responds to prolonged application of ice to the base of the head.

In meningeal inflammations and apoplexy of the spine, also in fever with high temperature, ice bags along the spine or ice compresses renewed every few minutes have very powerful anti-phlogistic effects.

Ice applied over the clavicular area in conjunction with very hot compresses applied over the area from the third cervical to the sixth dorsal vertebra between the shoulders, checks pulmonary hemorrhage.

An ice bag to the back of head and neck applied for 20 minutes, relieves tachycardia and can be used in conjunction with the local precordial compress.

Prolonged application of ice bags over the heart (15-30 minutes) slows the pulse and raises blood pressure. If too long continued depression of the heart takes place. The ice bag over the heart also tends to lower the temperature of the blood passing through it and thus exerts an antipyretic effect on the general circulation. If used for this purpose the bag must be renewed after 20-30 minutes, and the parts gently rubbed so as to permit reaction. *Chapman* bags applied to the spine are able to lower temperature in fevers. In ataxic cases of typhoid fever the bags

are renewed every 30 minutes with 5 minutes' interval for mild rubbing of the parts.

Chapman also recommends prolonged ice bags to the dorsal vertebræ for reflex sedation of the vasomotor nerves and sedation of the spinal nerves of this area. Prolonged use of ice bags to the lumbo-sacral region increases the circulation of the lower extremities.

On the stomach, the ice bag can be applied half hour before meals for 10–15 minutes, in anorexia and hypochlorhydria. If applied over the stomach or fifth dorsal vertebra the ice bags check vomiting and relieve the pain of cancer and ulcer of the stomach. In these cases the inhibitive effect is desired and the application must be prolonged. In hemorrhage of the stomach lumps of ice are swallowed and the ice bag is placed over the epigastrium.

In hemorrhages of any kind, cold acts as a hemostatic if *intense* and *prolonged* to 30 minutes; the ice bag must cover at least twice the *area* to be affected; especially in open wounds. In burns and scalding, ice compresses act well and relieve pain.

Ice applied to the lumbar region, the inner thigh, perineum and vagina causes contraction of the uterus, and is useful in menorrhagia and metrorrhagia.

In bleeding and inflamed hemorrhoids and intestinal and vesical hemorrhage, ice bags act as styptics and also inhibit inflammation. In cancer of the uterus and rectum continuous applications of ice relieve the pain and are preferable to morphine.

In sunstroke (insolation) the author has successfully employed the method of rubbing the patient with ice until reaction appears, in a number of cases. The patient is placed upon a sheet over a rubber covering, and three or four attendants keep rubbing the whole body in sections with pieces of ice to fit the hand, rubbing over different parts and looking for reaction. If reaction occurs the parts are rested and the rubbing resumed over other parts of the body. This process may, in some cases, require several hours before results are obtained. The writer has one case in mind which was practically moribund—temperature 107° F. with involuntary stool and urine—which after persistent *rubbing* with ice responded favorably after three hours.

While *absolutely condemning* ice packs or baths in this condition, the rubbing with ice produces abstraction of heat, cooling of the blood, with restoration of the function of the skin. The friction induces circulatory motion and carries new volumes of blood to the surface where it is cooled and eliminates toxins. The simple immersion of the body in the ice-bath, while cooling the blood, is apt to produce dermal paralysis and increase auto-intoxication. This slight difference in technic—the *rubbing and friction, plus the ice*, produces a vast difference in resulting physiological action and must be borne in mind.

Contraindications for applications of ice are in all cases where the locality has very low vitality owing to danger of necrosis, also in spinal irritation and in cases of locomotor ataxia with lightning-like pains and gastric and cystic crises.

Coils and Tubes

The *Winternitz* school has popularized the use of coils and tubes in hydrotherapy. They originally employed soft rubber tubing, others substituted tin and aluminum tubes. The aluminum tubes appear to the author to give the best service as the rubber tubing easily becomes brittle. The aluminum coils consist of tubing with a capacity of $\frac{1}{4}$ – $\frac{3}{8}$ inch diameter, fastened together with tape and shaped to fit about the head, heart or chest. One end of the tubing has a rubber end with metal-weighted tip, which is inserted into the vessel from which the water flows; the other end is similarly fitted and lowered into the receiving vessel.

The vessels used for supplying these coils contain usually six gallons of water, which is arranged at the required temperature and which is changed when the water has passed from the upper to the lower tub. The upper tub is placed on a shelf or table a few feet above the head or part to be treated, the lower tub at the side of the patient below the couch or bed.

The coil when applied is not placed directly upon the skin, but has a thin layer of moist soft cotton or linen cloth interposed.

An improvement on the separate shaped coils for different parts of the body is the *universal tube* devised by *Doctors Blu-*

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Fig. 27. Head-coil.



menkranz and *Helmer*, assistants to *Professor Winternitz*. This consists of a tube of thin rubber, 50 feet long, a round aluminum plate $1\frac{1}{2}$ inches in diameter, and several strips of aluminum of various lengths with the perforated ends. To connect and disconnect the strips with the plate the latter is supplied with a central screw and bolt. The strips may be changed as needed into turns of different lengths. Through the perforated ends of the strips the screw and bolt on the plate can be fastened and any sized or special coil constructed. The rubber tubing is carried from the periphery along the strips in spiral direction toward the center, and the free ends of the strips fastened upon the central screw-bolt by a second small nut.

The advantages of this universal tube consist in its modification for any desired locality, its rapidity of construction and its ease of repair. When a leak occurs, a piece of glass or hard rubber tubing can be interposed at the point of the break.

The coil for *head* treatment is arranged to fit the shape of the skull, and the water applied through it is usually cold. It is preferable to ice bags at this station, as ice bags are with difficulty kept in position. The indications are the same as given under cold compresses and ice bags (congestions, inflammations, etc.). The coil for the *neck* is valuable in respiratory troubles, tachycardia, in chorea and in sexual irritability. It is applied for 10 minutes twice a day. The coil for the neck is arranged on a couch or bed with a moist cloth above it, on which the patient rests the cervical spine in a recumbent position; the coil is then brought around the neck and kept in place by a broad bandage. (Fig. 27.)

The *gastric coil* has been employed by the *Winternitz* school* usually as a gastric sedative, employing *hot* water for the purpose. It is applied *in conjunction* with the cold, moist trunk pack or the cold abdominal bandage. In hyperemesis, in persistent eructations, globus hystericus, in anorexia and in hyperchlorhydria it acts well.

The *dorsal coil* replaces the *Chapman* bags in some cases, being useful in inflammatory conditions of the spinal cord. In

* *Winternitz Magenmittel*

tabes, myelitis, periosteal and osseous inflammation of the vertebræ, the dorsal coil is employed for several hours daily through an entire course of treatment. The dorsal coil acts well in delayed menstruation, nervous irritability and to improve the circulation of the lower extremities—habitual cold feet.

The *heart coil* consists of windings of the tubing sufficient to cover a diameter of 8 to 10 inches over the precordial area, a thin, soft, moist layer of linen or cotton cloth being interposed between it and the skin. The coil is fastened and the thorax is then covered and, depending on the effect desired, the coil remains *in situ* for 10 minutes to 2 hours. The heart coil is employed as an adjuvant to other treatments in cardiac lesions and replaces the use of drugs in many instances. (Fig. 28.)

In pericarditis, endocarditis and myocarditis, the temperature of the structures involved can be influenced and resolution hurried. In collapse, in tachycardia, in severe fevers, as in typhoid, in pneumonia, diphtheria, in hemoptysis, the heart coil improves the nutrition of the heart muscle by increasing the tonicity of the coronary arteries, and the heart muscle itself; blood-pressure is increased with slowing of contractions of the heart.

In mild valvular lesions, myocarditis and especially in increased frequency with weakness of the heart-muscle (as found in toxemias of various kinds) the heart-coil is the *true* heart stimulant, and if judiciously used will always replace alcoholic (so-called) "tonics." In chronic and severe valvular lesions; in chronic muscular degenerations and in cardiac neuroses, the coil, while beneficial, is not curative. In these cases the coil has been valuable as a *diagnostic* aid, for in cases of marked myocardial degeneration when the cold coil is applied the favorable reaction expected in *mild cases* does not occur, but *collapse* supervenes with increase of cyanosis, dyspnœa, and increase of the pulse. When these symptoms supervene the use of the cold coil, the diagnosis of *advanced myocardial* or *valvular disease* is positive. Palliative measures, such as the hot foment or hot-water coil, which diminishes the contraction of the heart, are indicated in these hopeless cases.

Contraindications for the *cold coil* are as pointed out above: advanced cases of myocardial degeneration—fatty and fibrous—

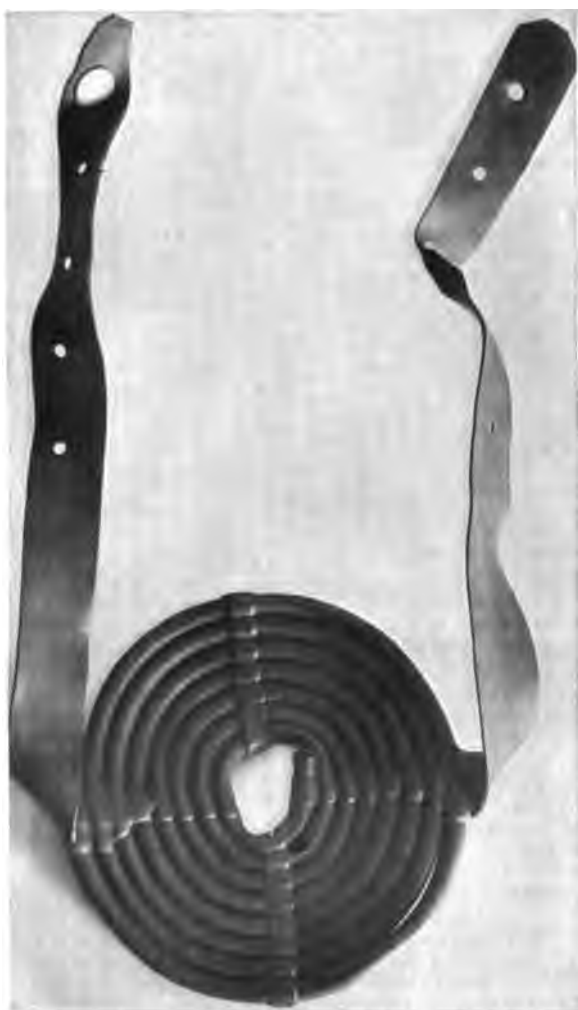


Fig. 28. Heart-coil.

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severe valvular lesions, advanced arterio-sclerosis, and also emphysema of the lung of long standing.

The *Winternitz* psychrophor—a urethral cooling catheter made in various calibers, the *Winternitz* rectal tube, the *Artzberger* rectal tube and the vaginal tube, for which special indications have been found, are instruments which the author has seen employed in European sanitaria, but with which he has but slight practical acquaintance, so that reference must be had to larger textbooks for their special technic and indications.

CHAPTER XV

TURKISH AND RUSSIAN BATHS, STEAM BOXES, DRY HOT-AIR APPARATUS, HOT WATER BAGS, STEAM

Some of above applications while not strictly hydropathic, but rather thermopathic, nevertheless are in such close relationship to hydiatric measures that they must be considered at this juncture, as they are frequently used as adjuvants or preparatory measures for the hydiatric procedures which accompany them.

THE TURKISH BATH

Turkish Baths can only be properly applied in especially equipped institutions or sanatoria. Nearly every city of any size contains one or more Turkish and Russian bath establishments, the arrangement of which, in some cities visited by the author, leaving much to be desired. The method of heating in some establishments where the heat is secured through radiators and *direct radiation* is to be condemned and should be prohibited by law, as the air becomes impregnated by the *effete exhalations* of the skin and lungs, and no fresh supply being procurable without lowering the temperature and ventilating, the same foul air is inhaled over and over by people visiting the rooms during the time the establishment is open. The best method for heating is by means of *indirect* radiation, so that the hot air sent into the chamber is comparatively pure and uncontaminated.

For a Turkish bath equipment there are requisite dressing and toilet rooms, two hot chambers for the reception of dry, hot air, one chamber averaging 120°-140° F., the other chamber registering 150°-190° F., a room for abluting and douching and a room for relaxation and rest after the procedure. If particularly well-equipped, a good-sized plunge will be found in addition to above.

All Turkish bath institutions ought to have a physician attached or require a physician's certificate for treatment, as the contraindications for some are vital, and many deaths have occurred in these baths which a preliminary examination of the heart, blood-vessels, kidneys and lungs would have obviated. Individuals with organic heart lesions, chronic croupous nephritis, cirrhosis of the kidney or liver, advanced arterio-sclerosis (danger of apoplexy), advanced respiratory lesions and aggravated lesions of any kind should not be permitted to indulge in these baths at any time.

The patient should, while undressing and before entering the hot-room, slowly drink two or three goblets of pure water or hot lemonade (to prepare for the great aqueous loss from the sweating process) and during the stay in the hot-room should drink slowly of water whenever thirst manifests itself. He is enveloped in a nude state in a sheet of warmed cloth and placed in a wooden reclining chair in the first chamber (120°-140° F.), has his head covered with a cold turban or cloth (to prevent cerebral congestion) and in some cases where this danger is feared, keeps his feet in a hot foot bath during the session. The author has frequently recommended (when perspiration is sluggish) a short, *warm*, general shower or douche (98°-100° F.) as a preparatory treatment to the Turkish bath, as it hurries the action of the sweat glands. The stay in the first hot chamber must depend upon the reaction, the sweating, and the sensations of the patient. Any marked headache or throbbing or sensation of depression must be a sign for leaving the room and receiving a stimulating shower or douche. In some cases the patient may then return to the hot room if his condition warrants it. If the patient does not perspire in the first chamber, the second hot chamber (150°-190° F.) must be tried for a few moments. This excessive heat must not be taken too long owing to its effect on the circulatory apparatus. It is advisable never to remain in the Turkish room over 30 minutes. When perspiration is well established, the patient leaves the Turkish rooms and is quickly placed under a warm shower or douche, which may be gradually cooled to produce reactive response. He is then placed on a warmed marble slab and briskly abluted with

warm water and scrubbed with soap; *individual brushes* are desirable or the *scrubbing should be dispensed with*. The author has had a case of syphilis under treatment, the etiology of which was undoubtedly due to infection from a Turkish bath scrubbing brush. During this ablution, gentle massage is usually indulged in by the attendants, directions for which can be given by the patient or prescribed by the physician.

After this cleansing process, another cold shower or douche will be administered, and when accessible, a short plunge or swim for one minute indulged in in a suitable tank at 60°-65° F. for reactive purposes. The patient is then briskly rubbed dry over a linen sheet and goes to rest in a recumbent position in a well-aired room. This rest is essential and should not be omitted, as various complications may arise if the patients should leave the baths before the skin and circulation resume fairly normal conditions. A rest of 30 minutes is the minimum; one hour is the best time. The physiological action of the Turkish bath is to vigorously stimulate the sweat glands, abstract water from the blood and tissues, and increase metabolism especially, catabolism—causing distinct loss of weight.

At the beginning of the heating process the heart commences to contract more rapidly and the pulse increases in frequency. When hyperemia of the cutaneous circulation supervenes, blood pressure is lowered and the pulse becomes slower, owing to relaxation of the general circulatory tone.

Respiration is increased during the treatment and with it the CO₂ exhalation and O intake is much augmented. Hot air apparatus or electric light baths are, however, to be preferred for this physiological result when same is desired to be derived from heat.

The uses of the Turkish bath are few from a strictly hydriatric standpoint. It is advised as a preparatory warming-up process for cold, stimulating procedures. It has value as an eliminating agent in carbon-acidemia, rheumatic and so-called uric acid conditions. It is also indicated in conditions of suboxidation, oxaluria, obesity (excepting when fatty degeneration or infiltration of heart is present) and in diabetes. In the latter disease when emaciation and nervous irritability is marked, the Turkish bath is contraindicated. In the absorption of exudates

this measure may be thought of, and when it is desired to produce relaxation and passive hyperemia of the respiratory tract (asthma, bronchitis, *early* pulmonary tuberculosis) its value, especially if pure, hot air is inhaled, has not been appreciated by all hydrotherapeutists.

THE RUSSIAN BATH

The Russian steam bath is usually found in connection with Turkish bath establishments, and its uses are similar. The same argument for pure air and physician's supervision applies here as in the Turkish bath.

The Russian bath is given in a room lined, as a rule, with marble slabs, on which patients may sit or rest; the steam pours into the room from openings in the lower ends of the walls and ventilators are supplied for the egress of the steam and air at the top. The room is also supplied with shower baths at each corner, or has a central pool of cold water into which the patient may immerse himself to secure cooling or reaction when necessary. The temperature should average 110°-115° F., and never be permitted to remain above 130°-140° for any length of time, as collapse will be invited. The stay in the steam room should consume 10-30 minutes and should be followed by ablutions of warm water or a cold shower. If the patient is soaped and scrubbed, *new or individual brushes* must be insisted upon owing to danger from infection of old brushes. A cold plunge and short swim acts as a vigorous reactive measure to the Russian bath. Drinking of water is desirable as in the Turkish bath. The patient may repeat this measure during one visit several times if reactive response is slow, and in acute respiratory lesions (bronchitis, laryngitis, la grippe) good results have been achieved by one hour's treatment with ten minutes in the steam room, five minutes for the ablution and plunge and rub-down, repeated three or four times. It must be emphasized that here, as in the Turkish bath, *abundant rest* must be taken after these vigorous procedures.

The physiological action of Russian baths is similar to the action of the heating procedures, hot air baths, Turkish baths, electric light baths, etc.

Perspiration is greatly augmented and the moisture collected about the skin, preventing radiation of heat, increases bodily temperature, and with it greatly increases metabolism. Oxidation is markedly augmented so that the bath is indicated in diseases of nutrition with suboxidation as a factor.

Lithemia, oxaluria, rheumatism, toxemias of various kinds, are benefited; in obesity and diabetes, although indicated, the baths are not so well tolerated and must be *forbidden* if cardiac lesions are present. In acute respiratory affections, as described above, the Russian baths act soothingly, loosen the catarrhal discharge and by creating passive hyperemia in the respiratory tract favor local phagocytosis.

An innovation noticed by the writer in the baths at Baden-Baden consisted in suspending from the ceilings large twigs of pine and spruce so that the steam became impregnated with the ozone and balmy emanations given off by the green branches. This appears to act particularly well in respiratory lesions, and the plan should be adopted by other establishments.

In skin diseases the Russian bath acts more kindly than the Turkish bath, the moisture rendering it less irritating.

Contraindications of the Russian bath are the same as in the *Turkish* bath with increased emphasis on danger of collapse from any cardiac taint. Neither Turkish or Russian baths must be repeated too often; one bath a week, at the utmost two per week are permissible for healthy reaction.

STEAM BOXES. HOT-AIR APPARATUS. ELECTRIC LIGHT CABINET

Steam boxes or hot-air boxes are square or oblong boxes arranged with radiators lining the sides and back and asbestos covering with openings in front and top, which admit the patient and close upon him so that merely the head and neck protrudes. The patient is prepared as usual and drinks liberally of cold water or lemonade before the bath and during the procedure also. The head is covered by a moist, cold turban or cloth or cap, which is changed every five minutes.

In lieu of steam or hot air radiators, the box may be heated



Fig. 29. Hot-air Box—Closed. Hydrotherapeutic Institute, New York.

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Fig. 30. Hot-air Box—Open.

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by a gas stove or oil stove placed inside of the box under the chair (with proper protection of the seat). The temperature should be watched by the attendant and not exceed 180°-190° F., the average being 130°-150° F., which usually causes abundant perspiration in 10 to 20 minutes. Where marked elimination is striven for, 30 minutes or even a longer time may be given, but in such cases repetition must not be more than bi-weekly. The patient after the warming up, is given a warm shower or warm ablution with gentle friction, and then a short, cold reactive shower or douche is administered for 10-20 seconds only.

If the treatment is given as a preparatory warming-up measure, the ablutions and rubbing are omitted and the cold bath or douche are administered for the indications presented.

The steam box or hot-air box is preferable to either the Turkish or Russian bath, for the reason that the patient breathes *pure air*, and excepting in respiratory lesions where hot, moist air acts well (Russian baths) can be substituted for either measures. The Turkish and Russian baths are preferred by some as they are unconfined and permit freedom of motion. Electric light cabinets are also employed for the production of heat and radiant energy and actinic effects are produced by the colors of the end of the spectrum. Many chapters could be written on these new aids in therapeutics alone. Depending on the number of lights, marked diaphoresis can be induced in from 5-10 minutes. (Figs. 29, 30, 31 and 32.)

Vapor or hot-air baths can be constructed at home, and there are numerous portable devices which can be bought in the market. An emergency or home device consists of using an open cane-seat chair fastening a metal sheet on the inferior aspect of the seat of the chair and placing a hot, moist or dry towel on the seat itself. An ordinary small lamp or oil stove may be placed below the seat underneath the metal, and the patient seated and warmly enveloped with heavy blankets, the wrapping up being arranged so as to exclude the *head* and keep in the heated air. A hot-air apparatus may be similarly prepared for a non-ambulant patient in bed, the heat being carried by tubes under the bed clothes, which are arranged so as to exclude the atmosphere.

The physiological action of these devices for administering heat is the same as detailed under the caption of Turkish and Russian baths. Diaphoresis is markedly stimulated, metabolism and oxidation increased, and diseases due to faulty oxidation or retention of toxic products rendered more amenable to resolution by the eliminative action on the sweat glands and the other emunctories.

The bowels frequently become constipated from these various heating applications, owing to the abstraction of fluids through the sweat. This is obviated to some extent if the technic regarding drinking water or fruit juices diluted with water *before* and *during* these procedures is carried out. The hot air treatment can be utilized locally also in cases of neuritis, lumbago, sciatica and in rheumatic affections generally. In obesity, the hot air treatment seems to be better borne than are Turkish or Russian baths, and the loss of adiposity can be accomplished just as well.

Contraindications are the same as given for Turkish and Russian baths. Skin lesions are usually aggravated by dry, hot-air applications.

STEAM, HOT WATER COILS, HOT WATER BAGS, ETC.

Steam has a limited, although well defined, therapeutic application. The *direct* action of steam causes absolute necrosis of tissue so that when we speak of steam employed therapeutically we refer to steam-laden air or compresses heated by steam.

Steam-laden air has a similar action as detailed under the Russian bath technic. It causes passive hyperemia of mucous membranes and the skin and thus favors local phagocytosis in infectious diseases. Mechanically the moist heat softens and loosens exudations, transudations and membranous formations, and its use is indicated therefore in tonsillitis, croup and diphtheria. Steam also acts as a styptic, and if applied intensely will check hemorrhage in comparatively large arteries. Steam also relieves spasm and acts as an analgesic in lesions such as neuralgias, cramps, colic and contractures.

In croup or diphtheria the improved "Croup Kettle" is of



Fig. 31. Electric Light Cabinet.

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Fig. 32. Improved Hot-air Cabinet.

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good service. A home-made device consists of using an ordinary tea-kettle and attaching a well-fitting cornucopia to the tip—inhaling the steam from the wide end of the cone.

In respiratory lesions, pharyngitis, laryngitis, tracheitis, bronchitis, asthma and broncho-pneumonia, these inhalations are given for 5 minutes, with 30 minutes' rest, during which time appropriate cold compresses are applied, to be changed after the next inhalation. The sedation, relaxation and eliminations procured by the steam, heat and moisture, followed by the tonic, stimulating effect of the *cold compress*, is a favorite prescription of the writer in respiratory conditions as mentioned above. A large variety of steam inhalers can be purchased, and many physicians medicate the inhalations. On the Continent these inhalations—given in specially constructed rooms, "*Inhalatoria*,"—are becoming quite popular, and the inhalation of medicines and the inhalation of hot air, steam and cold air, and very cold air, has been prescribed for definite indications.



FIG. 33—Improved Croup Kettle.
(Courtesy of Lewis & Conger.)

Jets of steam have been employed for hemostatic purposes over tumors and as a destructive agent and styptic in cancers. In advanced carcinoma of the uterus the repeated application of the steam jet checks the hemorrhage, destroys the foul odor and destroys and loosens devitalized or ulcerated tissue so that the surrounding healthy tissue has a chance for regeneration. In these cases an insulated hard-rubber tube with an olive-shaped tip perforated with numerous openings is employed and carried directly against the cervix. Treatment is usually given daily for 10–20 minutes and repeated until a clean surface is secured, when granulation is permitted if possible.

Steam has been employed in ulcerating fistulæ and hemorrhoids with success. Involution of the uterus is also favorably affected by steam douches.

Steam has been tested in skin diseases. In eczema, acne, psoriasis, lupus and sycosis, steam causes peeling off of the lesion with passive hyperemia and bactericidal action. The underlying tissues are aseptic, and if kept clean will tend to healthy resolution.

A method in the use of steam and boiling water in vogue among the Medicine Men of the Sioux tribe of Indians was described to the writer some years ago as a cure for cancer. The lesion is surrounded by a ridge of clay to wall-off healthy tissue, and the tumor is treated with steaming hot or boiling water. This heroic treatment, it was claimed by our informant, destroys the malignant tissue and causes healthy granulation to form in its place in due time.

Hot Water Coils are employed for sedative purposes (hyperemesis, eructations, neuralgia) and were spoken of in connection with cold water coils. They may be applied to any portion of the body, and if applied over the spine produce marked sedation in cases of hyperirritability.

Hot Water Bags have the same indications as hot fomentations. The same effect as with fomentations is obtained if the hot water bag is enveloped in a piece of moist flannel.

In using hot water bags the parts must be anointed with vaseline or olive oil and the *heat* of the bag tested, before applying same to the patient. Instructions to the attendant or nurse should be given to test the degree of heat on the cheek of the attendant *first* before applying the bag to the patient's anatomy, as a precautionary measure. A prominent New York hospital was recently sued for the scalding and burning of a patient with a hot water bag, due to carelessness of the nurse. If above instruction is followed, such occurrences and all damage will be obviated.

Hot water bags, like all other hot processes, produce analgesia, relaxation, absorption, passive hyperemia and leucocytosis. They must be renewed every 10-15 minutes to produce above physiological action.

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Indications for the hot water bag are the local relief of pain—spasm, colic, contractions—and the absorption of exudates and the therapeutic acquisition of passive hyperemia found so useful in all diseases of bacterial etiology. The hot water bag to the nape of the neck relieves headaches of neurasthenic etiology (migraine); the effect is enhanced if cold compresses are applied at the same time to the forehead and face and frequently renewed.

For the toothache of nervous origin, the hot water bag is invaluable; if inflammatory conditions pertain, the cold compress or ice bag acts better. Very often the alternating hot water bag and ice bag relieve when the single applications fail. In gastralgia, angina pectoris, gall-stone colic, intestinal colic, uterine pain and colic, delayed menstruation, coccygodynia, delayed dilatation of the os in pregnancy, and numerous other conditions, the anæsthetic and relaxing effect of heat applied through the medium of hot compresses or hot water bags has been found useful.

The scope of this volume precludes the mention of poultices (clay, antiphlogistine, Fango), hot bran, salt or sandbags, Dowse, Leucodescent, and various strengths of incandescent lamps, Thermophores, sun, air and electric light baths.

The principles involved as regards the properties of hydrothermotherapy have been as fully explained as the space warrants, and a separate volume can be written on these interesting agents alone.

CHAPTER XVI

IMBIBITION, IRRIGATIONS, ENTERO-CLYSIS, GARGLING, LAVAGE AND ENEMATA

When the subject of imbibition or absorption of water is broached during a course of lectures, there is usually a self-satisfied smile noticed upon the physiognomy of the auditors. There is, however, much to learn and much to be said upon this subject which is not as yet well understood or common property.

As a rule, not sufficient water, in its pure state, is imbibed by the human race. Many foods and beverages, however, are composed almost wholly of water (most fruits and vegetables contain from 95-98% of H_2O), and the compound is in this way received into the system, so that persons who habitually neglect the drinking of water *per se* do not suffer from this failure as much as would be expected.

Water is added to the system through imbibition by the mouth and its principal absorption is through the small intestines; it can also be absorbed through enemata in large amounts by the large intestines or by hypodermic injection. Water thus ingested remains in the body for a varying period of time, the temperature of the water and that of the body seeking equilibrium according to the laws of physics. Thus, cold water will, to a certain degree, remove heat from tissues; hot water add temperature to same; the degree of cold or heat and the length of time and area of application influencing the thermal exchange.

Water is rapidly absorbed and soon reaches the circulation, where it dilutes the blood and increases its volume; the blood plasma and corpuscles are carried along quicker, owing to increased blood pressure and blood volume, and every organ and tissue supplied by said circulation is acted upon.

Water conveys the fluid particles of food to the blood and is also the vehicle for the transportation of secretions and excretions. The permeability and elasticity of tissue also depend on the relative amount of water in the circulation. When there is a deficiency of water in the system, as is noted in nearly all fevers (dry skin, dry lips, thirst), function is impaired, secretions and excretions modified and general disturbances of health increased.

Drinking of *cold water* lessens the frequency of the pulse and improves its quality, and also the quality of cardiac contractions. If the cold water is taken in large quantities the respiration is also favorably influenced; it reflexly deepens and increases the respiratory act with resultant increased exhalation of CO_2 and increased aëration of the blood.

The dilution of the blood through steady water-drinking increases blood pressure, and the action of all the emunctories—the lungs, skin, kidneys, liver and intestines—is distinctly stimulated.

The amount of urine is greatly increased, and with it are carried off the end-products of metabolism—urea, phosphates, sulphates, etc. Uric acid and oxalic acid are diminished when water is taken in large amounts; they are products of suboxidation, and as water tends to stimulate oxidation, less uric acid, kreatinin, oxalic acid, xanthin, etc., is formed. The drinking of abundant water is, therefore, indicated physiologically in all cases of diseases where suboxidation is a factor—lithæmia, rheumatism, obesity, etc.

Not only is oxidation influenced but the dilution of the blood stream increases the *solvent* action of the blood. The increased volume and pressure obviates stasis and autointoxication as the catabolic waste is diluted and more readily excreted. In ptomaine poisoning, for instance, nature usually attempts to rid the system of the toxins through diarrhea and vomiting, the poisons being carried off partly in this way. If we assist this instinctive measure by giving large quantities of water, the effects of the poison will, after a while, be eliminated. The addition of potassium permanganate in 1:5000 solution to the drinking water as advocated, does nothing but increase the oxi-

dizing power of the water. It is the large volume of water ingested at regular intervals which must be depended upon for the curative action and not the permanganate.

Following the same line of reasoning it can safely be stated that the good results at the various springs, bads and sanatoria are not so much due to the chemical or mineral ingredients of the springs as to the fluid ingested at regular intervals and in prescribed amounts. The beneficial results of a milk diet are also largely due to the 87%–90% of water contained in the milk, although its solid constituent food ingredients are not denied value as a factor in the diet.

Hot water drinking, like cold water drinking, increases blood-pressure and reflexly increases cardiac contractions.

Hot water (hot lemonade) is especially stimulating to the sweat glands, the skin and mucous membranes, and should always be given as a preparatory to any sweating process to replace the aqueous waste.

Cold water if given *before* hydriatric treatments for the same purpose, should be sipped slowly so as to prevent reaction. The local action of various temperatures of water upon the stomach is interesting.

Cold water stimulates gastric secretion and is, therefore, indicated in apepsia and hypopepsia—hypochlorhydria. In these conditions it is best given, half glass of *very cold* water, half hour before meals.

Tepid water if given in large amounts, 4–5 glasses, is a good emetic—the emesis can be hurried by adding a pinch of salt to each glass.

The *swallowing of small pieces* of ice, on the other hand, acts well to relieve hyperemesis. The sipping of *very hot* water also acts as a gastric sedative and allays vomiting. The *ice* would be preferred in inflammatory states of the stomach, the *very hot water* in nervous or reflex conditions.

As the *cold water* is given for its stimulating and tonic qualities in hypochlorhydria, the drinking of hot water is prescribed for its relaxing and absorbing and atonic effect; thus *hyper*-chlorhydria is benefited by hot water, by the diminution in the excretion of hydrochloric acid and pepsin. Gastric catarrh and gas-

tralgia are also improved. In gastralgia the water must be very hot and must be swallowed quickly to achieve the relaxing effect.

Hot-water drinking is also used in obesity, to induce perspiration previous to hydropathic measures, cold water being imbibed in the interim.

In the treatment of *fevers* the drinking of water is very important. It must be emphasized that *indefinite measures or instructions* regarding the administration of water in fevers are to be condemned as severely as is the improper dosage of drugs. Prescribe the water in definite amounts. Give half-pint of water every two hours, especially if the urine is scanty. All the emunctories will respond to this regular administration and toxemia will be prevented in many instances. The drinking of cold water in fevers lowers the temperature, stimulates the heart, relieves stasis and obviates bacterial toxemia and auto-toxemia to a degree by its eliminative stimulation of the emunctories. Thus, if a severe cold or an attack of grippe was immediately treated by the absorption of large amounts of water, the symptoms of toxemia (CO_2 retention and bacterial and auto-toxines) would have scant chance for development.

The drinking of water in all diseases of nutrition, in all toxemias, fevers and so-called diatheses, is of distinct therapeutic value, the physiological basis for this statement having been prepared in the foregoing pages.

Thus, rheumatism, gout, obesity, diabetes, phthisis, cirrhosis of the liver, constipation, lithemia, oxaluria, are all favorably influenced by judicious prescriptions of water-drinking. *Doctor Kellogg* (Rational Hydrotherapy) recommends the drinking of water (contrary to former teaching) in *dropsy*, especially in local dropsy. We quote: "The increase in the specific gravity of the blood due to the rapid withdrawal of water by the kidneys and the skin, even to the extent of impoverishing the blood, prepares the way for the absorption of dropsical fluid; and by a repetition of this measure, from day to day, most remarkable therapeutic results may sometimes be obtained. Distilled water charged with carbonic acid gas should be employed, without the addition of sugar or any other substance, unless it be fruit juices

of some sort. The dose should be from one to two pints, and should be taken preferably before breakfast or an hour or so before dinner." The same author recommends taking water copiously in edema, one dose in the morning, the other in the evening, and *no liquids* in the interim.

Winternitz (Hydrotherapy—System of Physiologic Therapeutics) states: "When, however, it is desired to cause *disappearance of fluid effusions* and to stimulate absorption powerfully, it will be possible—however paradoxical it may seem—to effect this by drinking of cold water, if we alternate the administration of fluid with considerable intervals of abstinence from all drink. By this means the blood becomes more consistent, more impoverished in water, and best suited to take up fluid from the tissues and to initiate absorption and elimination. The ingestion of somewhat *larger* quantities of fluid every six to eight hours and the withholding of all fluids in the interval, best fulfill these indications. The more rapid absorption once initiated, does not remain confined to the elimination of fluid. It will thus not only be possible by means of the systematic drinking of water to render useful service in the presence of *dropsy*, but also opportunity will often be afforded of observing the more rapid absorption and elimination of *solid products of exudation and inflammation*."

In drug addictions, poisonings from drugs, the narcotism of tobacco, the drinking of water acts as an eliminant and relieves the system of poisonous elements.

Wray (Archiv fuer Augenheilkunde. 52 B. 4 Heft.) claims that *amblyopia* due to tobacco, is dependent on the saturation of the blood with the tobacco alkaloids. As nicotin is readily soluble in water, he insists that his patients drink an increased amount of water—four pints daily. Success was noted in all cases, normal vision returning in a short period of time. He advocates exercises such as walking in connection with the imbibition of water.

Doctor Salsbury's treatment of alimentary disturbances by means of hot-water drinking and a lean beef diet, enjoyed some popularity a decade since. The results obtained were due to the benefits of the solvent and eliminant value of water absorbed and the relief of fermentation and gas from the withdrawal of

carbohydrates. It can readily be appreciated that the drinking of *cold* water may have been indicated in many cases where hot water was contraindicated (hypochlorhydria, apepsia, etc.), and that continual hot water imbibition is debilitating and too relaxing to be of permanent benefit.

A simple adjuvant in the treatment of constipation consists in drinking a glass of *very cold water* an hour before breakfast and also the imbibition of water before retiring. In gall stones, jaundice and cirrhosis of the liver, large quantities of water, two to four quarts a day, act favorably.

The drinking of several glasses of water 15–30 minutes before *anæsthesia*, in many cases obviates the vomiting which so frequently supervenes the operation.

Hess (*Medical Record*, 1902,) has shown the fallacy of withholding water previous to operations by experiments along this line during his service in Bellevue Hospital, New York. He showed that post-operative vomiting was due to the irritation of the mucous membrane of the alimentary tract by the *anæsthetic*, and that the ingestion of water dilutes and absorbs the fumes and irritant particles, thus preventing gastric revolt and subsequent meteorism.

The *quality* of the water to be imbibed should be of the best. *Gautier* (Diet and Dietetics) considers a good palatable, odorless spring water, containing traces of minerals, especially very small amounts of lime, to be the best for health. In disease, *aërated*, distilled water is to be preferred. In all cases where well, lake or river water is used, it should be boiled and cooled in bottles. Cracked ice should never be served in water, owing to bacterial contaminations, unless the ice is made of distilled water.

The temperature of the water imbibed in health should be 65°–70° F., and drinking should be indulged in preferably *between* meals and not during meals. This prohibition attacks a fixed American hotel and restaurant habit, but it is founded on sound physiological principles. The drinking of water with meals affects the gastric juice and *succus entericus*, and retards digestion and often prevents digestion of starchy foods with resultant flatulence. *Gautier* (Diet and Dietetics) points out

that some patients have instinctive desire for water with meals (hyperchlorhydria), and as the water leaves the stomach in less than thirty minutes it may be permissible in these cases if taken immediately *before* meals, as digestion will be improved rather than retarded.

When simple water becomes distasteful to patients, the addition of fruit juices to the water is very grateful to the palate. These fruit juices (lemon, orange, raspberry, huckleberry, blackberry, pineapple, apple, currant, grape, grape fruit) besides rendering the taste more pleasant are *natural intestinal antiseptics* and contain the so-called "Natur-saltze"—natural salts (sodium, potassium, magnesium, etc.), which assist in the elimination of carbonic acid gas and prevent deposits of urates, uric acid and other end products of metabolism.

These fruit juices (contrary to old teaching) are particularly valuable where there is a rheumatic or gouty diathesis. To quote from *Gautier* (Diet and Dietetics): "Their acidity, due in a large measure to some acid salts (malates, citrates, tartrates, fumarates, etc.) varies from 0.2% to 1.5%. These salts, with alkaline bases, are transformed in the system by the complete combustion of their organic part into *soluble carbonates which alkalize the humours*, at the same time, by reason of the quantity of water that they provide and their special acidity, these fruits are, moreover, often a little diuretic and laxative, especially if they are not properly ripe."

Contraindications for the drinking of water are ulcers of the stomach and marked dilatation of the stomach. In either case the liquid can be added to the circulation by retention enemata.

Advanced cases of myocardial degeneration and arteriosclerosis must also be guarded against excess in imbibition, as collapse is invited.

IRRIGATIONS, LAVAGE, ENEMATA, ENTERO-CLYSIS

Under the term irrigation we may include the various methods employed for bringing different temperatures of water in contact with the mucous membranes, irrigation being applied without force and acting similarly to ablutions of the outer covering of

the body, the skin. We include under this heading, irrigations of the eye, ear, nose and throat (gargling) lavage, irrigation of the urethra, bladder, vagina, uterus, and the rectum and colon. Of the latter the retention enema has of late received increased attention owing to the writings of *Wernitz* and others on its value in fevers and toxemia.

Irrigation of the Eye is performed with any small tube giving a small stream with no shock. Hot water irrigations over the lids act well in inflammatory conditions of the Meibomian glands and the lids and also reflexly on the conjunctiva.

Irrigations of the Ear are useful as stimulating and cleansing agents in otitis media suppurativa chronica, hot water being carried into the meatus externus by means of a return-flow tube or catheter. Solutions as indicated may be added to the hot water, and they are followed by cold irrigation applied for 30 seconds only. Hot water irrigations also assist in cleansing the canal of impacted cerumen and also relieve the pain of otalgia.

Irrigations of the Nose if properly performed do service in catarrhal rhinitis and ozena. Special solutions may be added to the water as indicated. In epistaxis, irrigations with the addition of adrenalin are very efficient.

For catarrhal conditions the temperature is best employed at 100° F., and the patient should be instructed to have the flow pass into one nostril and leave through the other. This can be accomplished by slight practice, holding the head slightly backward and turning the head quickly to one side while the flow is passing up the nostril. Hot salt solution acts well in congestive conditions of the *Schneiderian* membrane.

Irrigation of the Throat, or Gargling. Gargling with water for buccal irritations and pharyngeal and tonsillar inflammation is practiced to some extent. The practice assists in cleansing the buccal cavity of debris and bacteria and should be practiced by taking a good mouthful of water, passing it back to the pharynx and by agitating the muscles bring it in contact with the tissues. Hot salt water gargles (one teaspoonful of salt to a large goblet of hot water) act well in congestive conditions of the pharynx and tonsils, and relieve irritating coughs frequently due to irritations of the throat. These hot gargles should always

be followed by a *short gargle* of cold water for its stimulating effect. The hot gargle is repeated *hourly* until improvement is noticed.

Irrigation of the Stomach, also Called Lavage

This useful, though frequently abused measure, has distinct indications, and when properly applied is invaluable in practice.

Lavage of the stomach was originally applied by means of a stomach pump, but this has now been replaced by the stomach tubes and siphoning. Several good devices for irrigating the stomach are procurable, the combination of the *Ewald* rubber tube with the *Leube-Rosenthal* apparatus (Fig. 34), being the most efficient. The regular 24–30 inch tube is employed and is attached to a Y-shaped glass or hard rubber tube to which are fastened the influx tube connected with a graduated glass container and the efflux tube which runs to a waste container or pail.

The glass container is hung or fastened some two or three feet above the head of the patient, and the influx tube has a clamp to permit shutting off the fluid. The efflux is also provided with a clamp which is opened when it is desired to evacuate the fluid from the stomach. This may occur at any time, as the stomach is not always tolerant, and the irrigation can be continued or interrupted in this way, as required. If much mucus is present the patient should agitate and shake his abdomen so as to loosen the mucus and reach all parts of the gastric mucous membrane. This part of the technic should not be omitted, as it assists in cleansing the stomach more thoroughly.

The stomach tube itself should be introduced—*lege artis*—warmed and lubricated with olive oil, the patient bending slightly *forward* (not backward) and the operator introducing the tube quickly and firmly to the esophagus, the patient being instructed to swallow. In poisoning cases or trismus, it is necessary in some cases, to extract several teeth in order to introduce the tube, and a mouth-gag is also necessary. The rule is to introduce water at 100° F., from one to three pints being used. When pressure is experienced by the patient the efflux clamp is opened and the fluid allowed to escape, and more fluid can then



Fig. 34. The Leube Lavage Apparatus.



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be introduced until tolerance is again reached. When the treatment is finished, the operator should firmly compress the stomach tube at its end so as to prevent liquid or solid particles from falling into the respiratory tract, as severe fits of coughing and collapse have occurred when through careless manipulation this accident has occurred. When employing lavage for cleansing purposes or in gastric catarrh, the irrigation is kept up until the return flow is clear. If blood of any amount is returned, the irrigation must be stopped.

Various solutions are employed for therapeutic purposes. For stimulating purposes, when water is employed, 100° F. is primarily introduced, to be followed by a short, cold irrigation. This irrigation acts well in hypochlorhydria, apepsia, constipation and in some cases of dilatation of the stomach. Hot and very hot irrigations, 105° and 130°–140° F., are beneficial in gastrorrhea, hyperchlorhydria, chronic gastralgia and chronic gastritis.

Lavage of the stomach for diagnostic purposes does not come within the province of this chapter, but the technic is the same as indicated above. The cleansing of the stomach in cases of poisoning and for the retention and stagnation of food is also a mechanical procedure. In obstruction of the pylorus it is best to use lavage twice a day; in catarrhal gastritis, where there are large quantities of mucus, daily washings until improvement is apparent are indicated.

In vomiting due to biliary stasis—cholecystitis and cholelithiasis, lavage gives great relief—employ a weak bicarbonate of sodium solution with the water at 105° F. for this purpose. Stercoraceous vomiting due to strangulated hernia, intussusception, torsion or adhesions of the intestines must be promptly treated with *frequent lavage*, as *fecal* absorption by the stomach is fatal if continued for hours at a time.

In some cases lavage, especially if followed by cold stimulating measures, stimulates peristalsis so as to restore the normal status.

Headaches of indefinite etiology are often relieved by repeated lavage. Muco-membranous enterocolitis is also benefited by this measure.

Contraindications: The lavage habit must be guarded against, as continued treatment is bound to be detrimental to the mucous membrane of the esophagus and stomach.

Lavage is contraindicated in ulcer of the stomach with recent hemorrhages, also in recent cases of hemoptysis owing to reflex irritation of the lungs.

Aneurism of the aorta, marked arterio sclerosis, recent cases of apoplexy and weak and debilitated patients must also avoid this treatment.

Lavage of the stomach of infants is accomplished by means of a catheter introduced while the child is firmly held by the nurse; it is attached to the Y-shaped tubing by means of a glass or hard rubber tube to which is attached another piece of larger rubber tubing. The catheter must be held in place at one side of the mouth as the child is apt to gag and vomit. The vomit can be allowed to pass out of the mouth but the catheter must be held in place, as it is difficult to reintroduce owing to the struggles of the child.

Lavage is employed for the same purpose as in adults—undigested food—curds of milk and mucus are removed, and in enterocolitis lavage acts well in permitting better digestion and clearing the upper alimentary tract of bacteria.

Irrigation of the Urethra

Irrigation of the urethra is performed by special methods and catheters (*Valentine*), and various temperatures of water and solutions are employed.

The catheters must be sterile and introduced with care, the technic indications being as follows:

Hot solutions produce local leucocytosis, increase absorption, relieve spasm and tension and act as analgesics. The canal is more readily cleared of mucus with heat than with cold. In making urethral irrigations pressure on the perineum prevents entrance of discharges into the bladder. In these treatments consecutive cystitis, ureteritis and pyelonephritis, through improper technic and lack of asepsis, must be guarded against. Acute gonorrheal and non-gonorrheal urethritis and prostatitis are benefited by these measures.

In gleet, *chronic* catarrhal prostatitis and *chronic* seminal vesiculitis, *alternate* hot irrigations followed by short, cold, sterile, stimulating irrigations are beneficial. The writer prefers in most cases, however, to act on these organs by means of carefully prescribed sitz baths.

The *Winternitz* psychrophor, a return-flow metal urethral catheter, is applied in *strictures* by means of gradually increasing calibrations. Prostatorrhoea, urethral hyperesthesia and sexual debility are benefited by the psychrophor. It is applied daily, starting with 2 minutes and gradually increasing the time to 15 minutes, the temperature of the water being 50°-60° F.

These cold irrigations have a stimulating effect and must be avoided in all *acute conditions* of the genital tract.

Irrigation of the Bladder

Irrigation of the bladder is performed with soft rubber catheters attached to a fountain syringe for which the catheter is detached for the return flow, or a modification of the *Leube-Rosenthal* irrigator may be employed.

The patient, in a recumbent or semi-recumbent position, is first catheterized, the catheter being introduced aseptically with usual precautions. For simple irrigations or bactericidal purposes solutions are best tempered at 100° F. In simple catarrhal cystitis, warm normal salt solution, 100°-105° F., acts well.

Where there is atony and enuresis, also in residual cases due to chronic prostatitis, enlarged prostate, the alternate hot followed by short, cold irrigations stimulate the muscular tone; in chronic catarrhal and ulcerating cystitis this means must be employed a number of times daily to ensure success.

In hemorrhage of the bladder—calculus, papilloma, carcinoma—irrigations of very hot normal salt solution with the addition of adrenalin check the bleeding.

In vesical fistula—vesico-vaginal fistulae, especially—*continuous irrigation* is required for restoration of the integrity of the cystic mucous membrane. *Hunner* (Journal of the American Medical Association, Dec. 21, 1907) gives his technic in cases of ulcerative, exudative, acute infectious (gonorrheal, tuberculosis,

streptococcic) cystitis and especially where vesicovaginal fistulæ exist. His success with these intractable cases, at Johns Hopkins Hospital, Baltimore, has been so marked as to warrant quotation of his method.

He employed a large portable bath tub (the same as are used in typhoid cases) which is filled daily to the desired depth with water at 100° F. To keep the temperature equable some of the water is withdrawn every hour or so and hot water added. Immersion in the tub is for eight hours and the water is changed one to three times during that time, depending on the temperature of the room. He suggests that if a tub were constructed for this continual bath treatment that a recess be built at one end of the tub where a *Bunsen* burner or a small oil lamp could heat the water and be adjusted so as to keep up an even temperature.

"The patient sits or lies on strips of canvas which stretch across the tub, and are held in position by brass clips. These canvas strips are about 22 inches wide and may be folded if narrower strips become desirable. The strip at the head of the tub on which rest the pillows is stretched as tightly as possible to form a back rest if the patient is sitting, and if she be reclining this strip is slackened. The strip at the foot may be separated a few inches from the middle strip on which the patient sits in order that she may easily pass her feet between them to the floor of the tub, and thus gain a rest by change of position. Light slats across the top of the tub are covered by a blanket and mackintosh, and these in turn by a white sheet or spread. This covering serves to retain the heat, makes a 'work table' for the patient, and presents a neat appearance. If a continuous irrigation is desired a gallon bottle rigged with a siphon rod and rubber tubing and set on a box on a table near the tub, will serve as the supply tank. Or a special earthenware jar and iron stand will be found more graceful and convenient for the constant use of a hospital. A large copper tank may be useful if one wishes to avoid refilling during the day. This rests over a gas range or a *Bunsen* burner, whose low flame insures an equable temperature for the irrigation.

"If the patient is not excoriated about the genitalia, and par-

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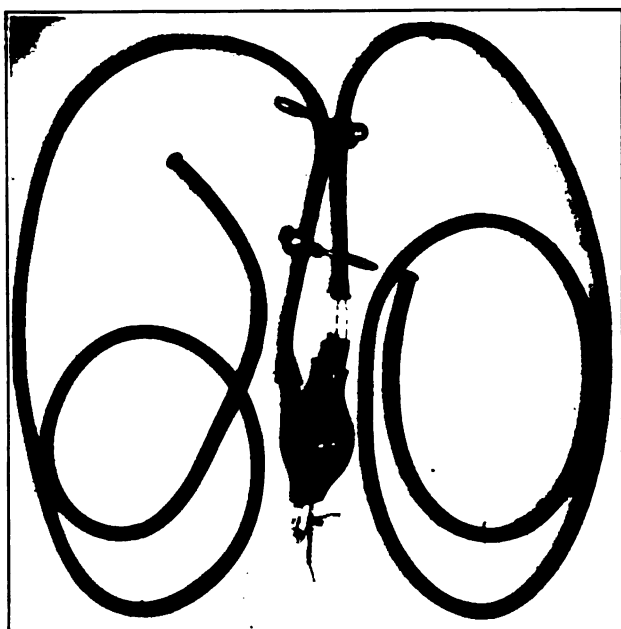


Fig. 35. Walzer Uterine Irrigator, with Connecting Tubes and Clasps.

Uterine

ticularly if she has little or no bladder pain, she does not require the sitz bath, and the tub may be arranged as above described, excepting the filling with water. The patient sits on the dry canvas strips, two of which are so separated under the buttocks as to allow the irrigation to run through to the bottom of the tub. In this manner a constant irrigation can be kept flowing with no other attention than that requisite for the supply bottle or tank.

"The force of the stream entering the bladder is regulated by the height of the supply tank, and the patient can modify the stream at any time by changing the caliber of the supply tubing through the use of an artery clamp applied to the side of the tub. The inflow must be regulated according to the sensitiveness of the bladder and to suit the freedom of the outflow, whether this be through a second tube in the urethra or through a suprapubic or vaginal fistula."

Hunner reports a number of intractable cases treated by this method, the treatment requiring a number of months, in one instance, two years for an ultimate cure, but considering the usual failure and the suffering and great discomfort in poorly treated or unsuccessful cases, this new technic must be hailed as a true therapeutic blessing and achievement.

Contraindications : Cold irrigation must be avoided in acute and subacute inflammations of the bladder, also in acute inflammations of the urethra and prostate gland.

Irrigation of the Vagina

Irrigations of the vagina are performed by means of a fountain syringe and hard rubber tip nozzle, which is sufficiently long so as to reach *back* of the cervix. The instruments and fluids must be aseptic, and care must be had not to irrigate the os, but spread the fluid around the cervix and vaginal walls. If continued for 30 minutes a temperature of 90° F. benefits pelvic congestion. Hot solutions, 105°–130° F. relieve pain, spasm and irritation and increase absorption of exudates.

Very hot (steam) and very cold temperatures check bleeding. The addition of adrenalin to a temperature of 100° F. normal

salt solution also acts as an efficient hemostatic. If ordinary temperatures are used there is no danger during pregnancy. When very cold irrigations have been employed, the contractions of the uterus induced have caused abortion. Extremes of *either* temperature must be avoided during pregnancy, as continued heat also has a relaxing effect on the uterus.

In spasm of the os or delayed dilatation, hot irrigations relieve pain and cause relaxation. Hot compresses over the pubis serve the same purpose. In relaxed conditions of the vaginal wall, cold, sterile irrigations of *short duration* favor tonic contractions and restoration of function.

Irrigation of the Uterus

Irrigations of the uterine mucous membrane are employed chiefly as a preoperative or postoperative measure, and a special catheter is utilized. Strict asepsis is imperative in all details. In the removal of clots and membranes after parturition, in sapremia and septicemia, frequent irrigations are indicated. The solutions should preferably be warm or hot, and additions to the water selected according to indications.

Walzer (Köln) has devised a new vaginal and uterine return-flow irrigator (Figs. 35, 36 and 37) which is simple of construction and readily applied. It consists of a pointed, perforated glass tube which passes through a pear-shaped, hard-rubber bulb which has perforations at the uterine end and an arm for the return flow. The vaginal end is firmly attached over the glass tube by means of rubber tubing.

The irrigator is sterilized and heated and introduced into the vagina, the glass tube projecting one inch from the rubber bulb. The connections are then made with the irrigator and the return-flow outlet, and the bulb is pressed slightly downward toward the perineum. After the irrigation it is best to wait a few minutes until the return-flow ceases, and then slowly withdraw the rubber bulb.

Hot irrigations must be applied in a recumbent or semi-recumbent position only. They are applied in the morning and evening, the temperature being 105°–115° F., the quantity of



Fig. 36. Walzer Uterine Irrigator. In Section; Bulb and Glass Irrigator.

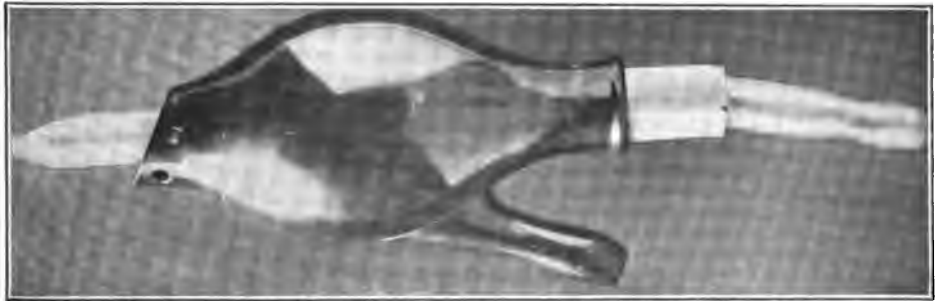


Fig. 37. Walzer Uterine Irrigator.

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fluid being from 2-5 quarts. After each irrigation the patient is instructed to remain recumbent for fully one hour.

Walzer gives the indications for hot irrigations as follows:

Subinvolution, parametritic and perimetritic exudates; inflammations of the adnexa, serous as well as purulent. Oophoritis, hematocele (retro uterine) when in a state of resorption. As a hemostatic (high temperatures) in hemorrhages in postpartum uterine atony, also to cause relaxation and softening of the rigid os intrapartum (*not* excessive heat).

Irrigations of the Rectum and Colon ; Enemata and Retention or Absorption Enemata

We differentiate an enema from an irrigation by the fact that in the former the fluids are retained for a shorter or longer period of time for absorption, dilatation or subsequent expulsion. In irrigations the return-flow is immediate or continued for a given period of time. The terms, however, are often used synonymously. Simple enemata in constipation and atony of the lower bowel are given with a fountain syringe, in some cases with a bulb (*Davidson*) syringe, and when used for stimulating and expulsive purposes are employed *cold*, using from one to two pints at one sitting. The patient rests on his back or on the left side, and should attempt to hold the fluid for a few minutes before permitting expulsion. This can be accomplished by turning over on the abdomen for a few minutes and taking the strain from the sphincters.

Simple enemata, when applied *hot*, 105°-120° F., relieve spasm, sphinctero-spasm and sphincteralgia and pain in proctitis and should be followed by *short, cold* irrigations.

Warm enemata at 95°-100° F. (indifferent zone) are employed to add fluid to the circulation when ingestion by the mouth is difficult or prohibited. The large intestine absorbs water in much larger amounts than does the stomach, and imbibition can be readily undertaken in this way. In pyloric obstruction, excessive dilatation of the stomach, esophageal stricture, ulcer and hemorrhage of the stomach, this measure will be thought of. Employ two pints at one sitting, using a high rectal tube, and

have the fluid retained as long as possible. This retention enema should be repeated four times a day. Retention enemata are also recommended as preoperative measures to prevent shock, and replace loss of blood and obviate meteorism. One half strength normal salt solution, 100° F., one quart at one treatment, is the best solution for this procedure.

Kellogg (Rational Hydrotherapy) has a paragraph concerning retention enemata which *every surgeon* ought to test and adopt. He administers an enema immediately after all laparotomies, and especially in all cases where adhesions have been found and broken up, for the purpose of creating peristalsis, and through distention and weight of the liquid replacing the intestines into their usual relative positions as a precaution against kinking and obstruction. "The value of this procedure in combination with other measures, pertaining chiefly to regimen and care, is attested by the fact that in dealing with more than seven hundred cases of abdominal surgery," he has "never been compelled to reopen the abdomen to relieve obstruction, and has a mortality of less than 3%; with a series of 165 successive operations for the removal of uterine and ovarian tumors and diseased appendages, without a single death."

The use of *cold enemata* in *fevers* has always been valued by hydrotherapists—the cold temperature stimulates the circulation and nervous system, reduces hyperpyrexia, and if frequently repeated washes out débris, prevents putrefaction and inhibits the growth of bacteria.

Wernitz (*Therapeutische Monatshefte*, No. 2, 1903), makes a strong plea for the use of the *cool retention enema*—in all cases of infection. He claims to have favorably influenced several severe cases of *puerperal sepsis* by his method, the technic of which follows:

The principle of the treatment consists in the addition to the circulation of the largest possible volume of fluid for the purpose of obviating the diminution of water in the system noted in all fevers, with the accompanying symptoms (dry lips and throat, dry, hot skin and thirst) and also in order to assist in the elimination of all the secretions so that toxins of all kinds are more

readily thrown off. The dilutions of the poisons through increased fluidity of the blood and the increased elimination of all secretions, assists the organism in its battle with the pathogenic micro-organisms, the deleterious action of the poison is lessened and the body gets a chance to form antitoxines. As the simple drinking of liquids was not entirely satisfactory, *Wernitz* applied the *Hegar* colon flushing method with certain modifications.

After a preliminary clearing of the bowels by means of a simple enema of warm water, a high rectal tube is inserted, warmed and oiled, as far as possible without producing pain, and from 1 to 1½ quarts of water, at 70°–75° F., is run into the tube with moderate pressure, a fountain syringe being employed. When the patient experiences distress from the pressure of the water in the intestines, the tube is disconnected and the water permitted to flow out. If the water shows contamination with fecal matter, it is changed during this operation until it returns clear. Fresh water is after a few minutes' rest again run into the intestine and held for 10–15 minutes, being evacuated by lowering the rectal tube whenever distressing to the patient. After an hour's rest the operation is repeated, and in ordinary cases toleration of the water is established, and three or four more irrigations are prescribed at suitable intervals during the day. Absorption of water by the large intestine takes place rapidly, the pulse becomes fuller, the dry mucous membrane becomes moist, the patient looks improved, and headaches and delirium disappear or are obviated. After the second or third flushing, perspiration becomes active, and whenever the process is repeated the sweating is renewed, often in a marked degree. The temperature is at first lowered during the secretion of the sweat, and later, on repetition of the flushings, becomes permanently reduced. The amount of urine is often increased to five or six quarts a day.

The number of flushings prescribed depends on the case. In a severe case of sepsis, ten irrigations were given within 24 hours, with remarkable improvement. In mild cases fewer flushings are required.

No antipyretic measure is able to so quickly reduce tempera-

ture without complications of any kind occurring as is this one. The increase in the urine and perspiration and the reduction in the temperature occurs successively, and there is rarely any sensation of prostration following its use. There is no cardiac disturbance, no collapse, as the surplus of the absorbed fluid is excreted by the urine and sweat. There is no danger of overwhelming the heart as there is in hypodermoclysis or transfusion, as the mucous membrane, when saturated, does not absorb liquid but relinquishes it.

This *colon flushing* method should be thought of in all fevers, toxemias (auto-bacterial or extraneous), and in diseases of nutrition when elimination is faulty. It is a therapeutic measure, the merits of which are bound to be recognized, if not at once, certainly within the next decade.

Hot colon flushings, 110°-120° F., are particularly recommended in collapse, whether from shock, after surgical operations or after exhausting diseases, typhoid, dysentery, cholera, hemorrhages, etc. From one to two quarts of hot normal salt solution is given at one treatment, and the flushing is repeated hourly until improvement is noted. Hot colon flushing is also beneficial in most pelvic congestions and inflammations, in sciatica and in chronic prostatitis and cystitis. It also acts well reflexly in jaundice, biliary stasis, cholelithiasis and colic—biliary, renal and intestinal.

In anuria and in croupous nephritis, chronic and acute exacerbations, the author knows of no better remedy than repeated hot rectal and colon irrigations. They will cause the kidneys to resume function when drugs fail. Repeat half hourly if necessary, using 1-2 pints. In infectious enteritis and colitis, cold flushings are preferable, and in all diarrheas the rule is to give a flushing of *cold, sterile water after each movement*. If this rule was followed in the infectious diarrheas of infants and children the mortality would be reduced to a minimum.

In inflammations of the intestine and colon with large amounts of mucus or membranes, *mucous-membranous enterocolitis*, the hot, normal salt flushing is indicated (it relieves the colic, dissolves the mucus and loosens the membranes) and it should be followed by a short, tonic, *cold* flushing, for stimulating purposes.

Contraindications for enemata, clysis, flushings and irrigations are found in chronic ulcerative conditions of the bowels where danger of perforation is present. In ordinary inflammations this contingency is not to be expected, excepting from possible excessive distention due to improper technic.

Hypodermoclysis or Subcutaneous Infusion

Hypodermoclysis can be included among hydrotherapeutic measures, although it reaches somewhat into the domain of surgery.

The principles involved in the introduction of fluids to the circulation have been touched upon in previous chapters and hypodermoclysis is selected for the purpose of adding fluids (either normal salt solution or normal salt and sugar solutions) *quickly* to the circulation in cases of threatened collapse, shock after operations, loss of blood from hemorrhages, exhaustion from disease or strain, when the *slower colon flushing method* cannot be depended upon for rapid absorption. In paresis of the intestines, when absorption is almost negative, hypodermoclysis must also be called upon.

The stimulating action of the introduction of the salt solution is noticed by the prompt response of the heart muscle and the rapid action on the emunctories—the kidneys and the skin.

An aspirating needle attached by means of a rubber tubing to a fountain syringe or graduated beaker with appropriate opening, may be employed. The skin about the part to be punctured must be rendered aseptic, the fluid sterile and *filtered* and the needle boiled immediately before introducing same beneath the cutaneous layers. The fluid employed should be 102°–103° F. when placed in the beaker or bag (all instruments must be sterile) and the quantity should vary depending on the case, from one to two pints for one clysis.

The areas preferably selected for puncture are such as are rich in lymphatics, the tissue below the breast, the gluteal region, the anterior aspect of the axilla or the abdominal wall, and the fluid should flow by slow gravity and not be forced. Slow introduction is always advantageous and has no drawbacks.

The clysis may be repeated two or three times daily when symptoms demand it.

Contraindications : In cases of marked valvular and myocardial disease, hypodermoclysis is dangerous as it may overload the heart and cause paralysis. Embolism must be kept in mind; the introduction of air be guarded against and the solutions must be *filtered* so as to guard against foreign particles being carried into the circulation. Too rapid introduction of the fluid has been followed by paralysis of the heart muscle, so that simple gravity must be depended upon in all cases.

Peritoneal Infusion

Peritoneal infusion is frequently employed after laparotomies, normal salt solution, one to two quarts being preferred, at 102° F. This infusion obviates postoperative shock, restores the circulatory tone, including the heart, relieves the system of toxins (in sepsis) by dilution and increases absorption by the lymphatics. In septic cases the measure is invaluable and has saved many lives. The use of peritoneal infusions of sterile olive oil to prevent adhesions after manipulations of the intestines advocated by *Dr. Walter G. Crump*, New York, deserves the greatest publicity as its employment is followed by excellent results.

Posture is of some importance in peritoneal infusions, the "*Fowler*" upright posture being the method in general use at present, as it favors rapid absorption.

CHAPTER XVII

BATHS FOR HYGIENIC AND PROPHYLACTIC PURPOSES. OUT-DOOR BATHS; LAKE, RIVER, OCEAN BATHS

Baths, if taken for hygienic purposes, should consist of full-baths taken preferably in the morning at a temperature of 80° to 95° F., for ten to fifteen minutes, to be followed by a quick, cold ablution or shower. In young people the lower temperature is employed; in more advanced life, the higher temperature is best.

If shower baths are employed, the warm shower should be applied all over the body excepting the head, and the procedure should be followed by the cold, stimulating shower of only a few seconds' duration.

This alternation of warmth, followed by cold, is the best for health, the principles involved having been dilated upon in the chapters on ablutions and baths. There are no *contraindications* for these measures, if carried out with due regard to the strength and age of the patient. In severe cardiac lesions and arterio-sclerosis with tendency to apoplexy, bathing must be either prohibited or be under the guidance of the attending physician.

Out-door bathing during the summer season is invigorating, and the combination of the air baths with the marked reaction secured from contact with the cold water of rivers and lakes is stimulating to the circulation and nervous system. The same principles apply here as given in the chapter on cold, full baths, with the same *contraindications*.

River and Lake Bathing should never consume over ten to fifteen minutes, and vigorous exercise should be indulged in during immersion. The body should be warm before immersion and the bather must not stand around to cool off, but in a warm state, first moistening the chest, neck and face to prevent circ-

bral congestion, quickly plunge into the cold water and commence exercising at once. This produces the salutary "glow" and the favorable results desired from properly conducted cold procedures. The same rule as regards time of bathing applies here as in *all* hydrotherapeutic procedures: at least thirty minutes *before* meals and preferably two hours *after* meals. One bath daily is sufficient, although in very hot weather a short morning and night dip is not harmful.

Sea Bathing has several distinct *contraindications* which it is well for the physician to be cognizant of, especially in view of the multitudes who annually spend their vacations at the seashore. Thus, patients of very low vitality and aggravated cases of neurasthenia usually react poorly at the seashore owing to the marked stimulation of the moist air and the sea baths. Many skin lesions, cases of rheumatism, epilepsy and gout are aggravated at the seashore.

Patients with marked valvular and myocardial lesions, and those suffering from arterio-sclerosis (tendency to apoplexy) must shun the ocean. Attacks of angina pectoris have frequently been caused owing to the increased blood pressure and tension induced at the seashore. Cardiac lesions do much better in the country at very moderate altitudes and level ground. The sea air and sea baths cause palpitation, dyspnoea, and in some cases collapse. Cases of pulmonary tuberculosis with tendency to hemorrhages, and patients subject to hematemesis and menorrhagia, must also prefer the country.

The diseases which are benefited by the sea air and sea bathing are tuberculosis of the bones and joints, tuberculosis of the lung (non-hemorrhagic and not *too far advanced*), and *practically all respiratory lesions*, excepting when they are far advanced, when the stimulating influence of sea air and salt baths cannot be favorably reacted upon.

Many hay-fever sufferers gain immunity from attacks while on the ocean or living on a yacht or directly on the beach. The sea air and sea baths are particularly beneficial to convalescents after bronchial, pleuritic or pneumonic attacks. Mild cases of neurasthenia, psychasthenia and hysteria also react favorably at the seashore. In anemia and chlorosis sea baths (*short*, cold

immersions) 1 to 2 minutes b. i. d., act well, increasing the percentage of hemoglobin and the number of erythrocytes and white blood corpuscles.

In exophthalmic goiter, adenitis, simple and tubercular, results at the seashore are excellent. Patients should always consult their physicians in regard to the character of their exercise, air baths and sea baths when visiting the seashore, as these measures are vigorous tonics and must be prescribed with due caution. When taking sea baths the same preliminaries detailed under the heading of full baths must be observed. The body should be *warm* before immersion; the bather should ablute the chest, neck and face before immersion, and the proper time should be selected. (Half hour before meals, two hours after meals.) The bath for stimulation should last from 5–10 minutes only, with active movements or friction. In hot weather 15–20 minutes of the sea bath should be the maximum, otherwise the benefits anticipated from it will be lost. The habit of spending an hour or longer in the surf, if continued for some time, is distinctly detrimental to health.

When sea baths are prescribed for convalescents or invalids it is best to accustom them to the sea water by preliminary tub or pool baths, extending the time of immersion gradually as reaction is secured and if same is favorable, indulging in the vigorous sea or surf bath where the action of the waves, the refreshing cold and the exercises have a marked tonic effect upon the whole economy.

The patient should not feel tired or exhausted after the bath—if he is, the time must be shortened, sometimes starting with one minute, and gradually increasing until the maximum 10 minutes is reached.

Daily baths are permissible in most cases, although some patients gain more rapidly when taking baths every other day only.

When indoor salt or sea baths are taken they must be under the supervision of the physician who directs the length of time of immersion, of temperature, and the character of the baths. Sea or salt baths are powerful tonics, the salts in many locations being 3%–4%, which act as irritants to the peripheral nerves and the sudoriparous glands and produce marked reaction.

CHAPTER XVIII

THERAPEUTIC CHAPTERS

Practical Applications of Hydrothermotherapy

The diseases or conditions of ill health, which will be treated in the therapeutic chapters of this volume, do not by any means cover the whole field in which hydrotherapy is applicable. The scope of this work limits us to the most important diseases, and the previous chapters on physiologic action and technic will permit the general application of hydrothermic measures when indicated. *Although convinced of the almost universality of these applications, we do not desire to be classed among those who, in their zeal, announce hydrothermotherapy as a panacea or cure-all.* Its ready accessibility, its freedom from great expense and its ease of application make hydrotherapy invaluable to the physician as well as to the layman, and there are few abnormal conditions where *some* modality of hydrothermo therapeutics is not called upon to do yeoman service. The triumphs of hydrotherapy in fevers, especially in typhoid fever, where hydrotherapy has succeeded in penetrating the citadel of conservatism and of traditional medicine which has hampered the progress of the art of healing for ages, are alone sufficient to convince the most skeptical among physicians of the virtues of water in disease.

The reader, however, is cautioned against employing this agent for the symptom "fever" *per se*. As understood by modern teleologic investigations, fever merely represents the *reaction* of the economy to abnormal cellular conditions, and the latest and eventually the best therapy will be based on the principles of imitating nature in its inherent defenses against disease. *Vide* the success of *Professor Bier's* new (though how ancient!) hyperemia treatment as applied to a variety of lesions. The

use of coal-tar products to suppress fever is illogical and harmful and will, if progress in medicine continues, be classed as malpractice. We must not suppress the fever, we must direct our efforts to remove the factors that have provoked the reaction of the economy called "fever," by removing the cause mechanically or surgically, by eliminating the toxins or abnormal deposits and correcting abnormalities in circulation or nerve conduction wherever possible. If our knowledge is insufficient to find and remove the cause, we must conserve and stimulate the vital functions, the heart and circulation, the nervous system, the emunctories and viscera as a whole, so that the economy itself can elaborate its protective principles—alexins, antibodies, antitoxins—phagocytes—to counteract, destroy and eliminate the cause of disease.

In following these broad principles we must *individualize* and treat the *patient* and not the *name* of the disease, the diagnosis or name of the disease having invaluable bearing on prophylaxis, diet, hygiene and prognosis, but otherwise the *symptoms of the individual* should be treated and not the general trend of symptoms or the pathology of the disease. Thus, two cases of typhoid fever in one family may require distinct modalities of hydrothermic applications. To order the *Brand* bath or to try to produce intestinal antiseptics (*sic*) in all cases of typhoid fever diagnosis is on a par with the use of the morphine hypodermic in *all* cases of pain.

Infectious diseases vary in their intensity and duration depending on the elaborated toxins of the specific germ or germs and the autotoxins of the attacked system. They also vary depending on the portion of the body affected. Patients of weak constitution and lowered resistance offer but a mild defense to the invasion of bacteria which thrive in a congenial, nonresisting soil, and the efforts of the physician must, therefore, be directed to the strengthening of the organism, the elimination of the toxins from the blood, lymph and tissues, and by increasing fluxion and hyperemia of the corrected circulatory supply, secure improved metabolism, phagocytosis and other inherent corrective measures resultant therefrom.

Hydrotherapy is able to accomplish all these objects. It

stimulates, corrects, regulates and facilitates all excretions and secretions of the organism. The increased activity of the skin relieves and assists the kidneys and lungs in their eliminative functions. Fluxion and hyperemia can increase circulation (and coincident functions) in any organ which it is desired to stimulate, or ischemia and anemia can be induced if temporary inhibition is required. Thus, the heart, lungs, liver, kidneys, intestines and glandular organs can all be directly influenced, and their functions modified depending on the case. Increase of excretory function of the emunctories in disease is invariably coincident with increased vitality and improvement in symptoms of the patient.

The experienced physician in cases of pneumonia, diphtheria, scarlet fever and all severe toxemias, will pay as much attention to the heart and the reaction of the nervous system as to the locality of the disease itself, for in the end it is the resisting power of the organism based on the nervous and circulatory system and its functionating viscera which will triumph over the cause of the disease and measures directed to the conserving and strengthening of these basic functionating portions of the economy will be the measures which will lead to success in therapeutics.

Typhoid fever, of all diseases, offers so many opportunities for hydrothermic applications that we will begin this portion of the volume with a careful review of its treatment along hydrotherapeutic lines. If these measures are studied intelligently the reader will be able to treat many cases of toxemia along similar lines.

CHAPTER XIX

BACTERIAL AND PARASITIC TOXEMIAS

TYPHOID FEVER

In typhoid fever hydrotherapy has won its early laurels, and its extension and use in other diseases is only a matter of time and education. Reports of failures in typhoid fever with the use of hydrotherapy are usually upon investigation found to be due to faulty technic. The claim of *Brand* that no case of typhoid fever ought to be fatal if taken early enough, is based on statistics of many thousand cases, and cannot be overthrown by individual failures. To be on the safe side all cases of remittent fever should be immediately put to bed, for rest is an essential in all vital disturbances. This physical rest should be supplemented by psychic rest by keeping away anxious relatives and friends. The next step is to treat the symptoms and case at once, as if the diagnosis of typhoid fever had been made by means of the *Widal* and *Diazo* tests or as if the rose-spot dermal metastases had clinched the diagnosis. Treatment must be started *before* these collected symptoms are found to secure universal good results.

Baruch's sign (resistance of the rectal temperature to a bath with friction given at 75° F. for 15 minutes) will assist in clearing the diagnosis. It is an almost infallible pathognomic sign in suspected typhoid fever, and can be ascertained much earlier than the *Widal* blood test.

It must not be forgotten that typhoid fever is not a local intestinal lesion with ulceration of Peyer's patches, but a bacterial toxemia—the blood and many organs containing the Eberth bacillus and its elaborated toxins in as large numbers as are the pyogenic germs in septicemia, and typhoid intestinal antiseptics alone is,

therefore, doomed to failure. The whole organism must be treated, not the local intestinal manifestations of the disease.

To prevent further infection, have all liquids *boiled* (water and milk), withhold all solid food, feeding at two hour intervals with sour milk, zoolak, matzoon, or other makes of lactic acid milk (*Bacillus Bulgaricus*), buttermilk, and one-half pint to one pint of germ-free water every two hours. Fruit juice may be given liberally or the water may be mixed with same. Cereals, if strained, may be added to the diet, results determining if same can be continued.

Brand's directions were that when rectal temperature reached 102° F. the full bath should be given and repeated, depending on the reaction and the height of the temperature. It is best, however, not to be guided by the temperature alone in the use of hydrotherapy. There have been cases of typhoid fever in which vital reaction was so weak that little or no fever was produced.

The technic of the cold, full bath (Fig. 38) recommended by *Brand* in typhoid fever is as follows:

The patient being prepared as outlined in other chapters, is carried to the bath tub or assisted there, or, if a portable tub is to be had this is wheeled to the bedside. The temperature of the water is 65° F. The patient in a nude condition is quickly assisted into the tub or immersed at once (previously having had his face and chest sponged with cold water!) up to the chin in the water. The head has a cold, moist turban wrapped about it with the ends so arranged that the drippings fall down the back. The patient's attendants commence to rub him vigorously as soon as he is immersed, for three minutes, and he is then placed in a sitting position and has several gallons of water at 50° F. poured upon his head and neck; this should consume only a few seconds, and the patient is again immersed up to the chin and the friction all over the body (excepting the abdomen) resumed for five minutes. The patient is again placed in a sitting position and the pouring of the cold water over the head and neck repeated as before. He is again immersed and rubbed for three to five minutes more. The duration of the bath, depending on the patient's vitality, should consume about 15



Fig. 38. Portable Full-bath. Especially Adapted for Typhoid Fever Cases.



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minutes. In some cases 10 minutes is the maximum, or if the patient chatters and becomes cyanosed after longer treatments they must be shortened or other measures employed. The bath is repeated every 3 hours, or sooner if the rectal temperature exceeds 102° F.

The *contraindications* for the *Brand* bath are old age, infancy, excessive debility, heart lesions, tuberculosis of the lungs, aneurism of aorta, arterio-sclerosis and pregnancy.

Between the *Brand* bath treatments the cold *abdominal* bandage should be worn and changed every thirty minutes (sooner if it gets dry and warm). This abdominal bandage is of great assistance in obviating headache, delirium and meteorism and by reflexly stimulating the diaphragm prevents hypostatic pneumonia. While the *Brand* baths are usually discontinued between 11 P. M. and 6 A. M., to give the patient a rest, the cold abdominal bandage must be kept *in situ*, and if the patient is not to be disturbed the bandage can be remoistened with cold water by means of a sponge without disturbing the patient for any length of time.

Cold rectal irrigations are given *after each* movement, and two or three colon retention enemata given daily. If nephritis has supervened these retention enemata are given *hot* to reflexly stimulate the renal function.

In many cases the inherent fear of cold water compels modification of the *Brand* bath. The *prolonged* warm, full bath acts favorably in such cases and is preferred by many practitioners. The bath is arranged at 85°–90° F., and given for 20–30 minutes, with cold affusions to the head, neck and chest every 3 minutes, and *friction* during the whole immersion. This *prolonged* warm bath was the favorite measure of the late *Doctor Kuhn*, and he claimed to have had practically no mortality in typhoid fever during fifty years of practice by its use. Two prolonged warm baths were given daily, one at 10 A. M., the second at 4 P. M., and between the baths the cold abdominal bandage was worn and changed half hourly or whenever it became warm and dry. Cold rectal irrigations were given after each movement, and one or two gallons of cold, pure drinking water imbibed daily.

When full baths cannot be given owing to contraindications,

lack of facilities, inaccessibility of the bath-room, weight of the patient or other causes, *cold sectional ablutions* must be substituted. The technic of this measure was described in the previous chapters, and it must only be reiterated that correct technic must be adhered to—*three* ablutions in sections constituting one treatment, and they are *repeated* every 3 hours as a rule. If toxemia is profound, hot sectional ablutions are given, to be followed at once by cold sectional ablutions for their tonic effect. The author has found this combination to act favorably in several severe cases. These alternate hot and cold sectional ablutions should be repeated every 3 hours until the temperature and symptoms of toxemia show signs of improvement, when the usual cold sectional ablutions can be resumed.

Complications during the course of typhoid fever must be combated according to the principles outlined in the previous chapters.

Thus headache responds to the ice compress or cold turban. Epistaxis requires an ice bag or ice compress to the back of the neck and over the face. The mouth must be kept from sordes by irrigations and cleansing with warm water. The action of the heart must be carefully watched. The heart coil or the cold stimulating compress over the precordial area invigorates the heart muscle and lowers temperature. In endocarditis or myocarditis the hot compress for one-half minute, followed by the ice compress for 10 minutes, renewed four or five times hourly until *pain* ceases, is indicated.

Respiratory complications are usually obviated if the abdominal bandage is applied constantly. If pneumonic conditions supervene, the cross-binder cold compress will favor resolution. Pleuritis is treated with hot local compresses followed by general cold chest bandages.

Gastric and intestinal complications respond to hydiatric measures. Tympanites is relieved by alternate hot followed by cold compresses and high rectal enemata. Diarrhea is benefited by cold enemata given after each movement. If delirium and coma supervene the hot pack and hot rectal enemata followed by cold sectional ablutions, given hourly until improvement sets in, must be called to our assistance. In hemorrhages, alimenta-

tion must cease for 24–48 hours and inhibitive measures employed—ice compresses over the abdomen or adrenalin irrigations may be tried.

In anuria, cystitis and nephritis repeated hot rectal enemata, followed, if necessary, with the hot, moist pack, act favorably.

Bed sores must be treated with the stimulating cold compress and the parts relieved of stasis and pressure.

SEPTICEMIA AND PYEMIA

In septicemia and pyemia the evacuation and drainage of abscesses, wherever discovered, must be the first measure. The next step consists in conserving the vital functions and keeping the heart from deteriorating by the measures advocated under typhoid fever. The heart coil or cold compress, copious water-drinking (one gallon a day, minimum) and cold sectional ablutions will be employed as circulatory tonics.

The next important step is to procure increased elimination. It has been found that the sweat glands eliminate pyogenic germs, and these can be stimulated by the hot, moist linen or blanket pack, followed by cold, stimulating ablutions, given every six hours.

The *Wernitz* colon flushing method, the rationale of which was discussed in a previous chapter, has been employed in septicemia with much success. A large number of these flushings must be given in septic infections, one treatment every 2 hours as a minimum, in order to induce copious diaphoresis and diuresis and coincident elimination of toxins. In a recent case under the author's observation *hot, normal salt* solution given as a retention enema, one quart hourly, was followed by favorable results. Whether the normal salt solution is to be preferred to the simple water, as advocated by *Wernitz*, remains to be determined by crucial tests.

The writer from physiological considerations would prefer the employment of the normal salt solution in all intoxications where the ingestion of sodium chloride is not contraindicated. When nephritis complicates the case, plain water is to be preferred to the saline.

The colon flushing method—retention enemata—deserves the most careful trial by hospitals and private physicians, as its results are undisputed and there is *no danger* in its application.

SYPHILIS

The epochal discovery of the late *Dr. Fritz Schaudinn* of the spirochæta pallida as the etiological factor in syphilis, places this disease among parasitic infections and emphasizes the value of hydrothermic processes as adjuncts to specific or symptomatic medical treatment. The presence of the parasite in the economy with its elaboration of toxins makes the question of securing increased emunctorial elimination one of supreme importance and explains the good results from hot baths in a two-fold manner; primarily, the increased elimination by the sweat glands of toxins and secondarily the better absorption of medication through the effects of dilatation and peripheral relaxation of the blood-vessels when given as inunctions after *hot packs* or *baths*.

There have been numerous cases of syphilis reported which were cured spontaneously or without the use of drugs—if the diagnosis in these cases was correct, it would indicate that the economy is able in some way as yet unknown to us (antitoxines antibodies, etc.) to counteract and destroy the parasites and their poisonous excreta. The *Winternitz* school has also established the fact that by combining stimulating measures—half bath, douches, air baths, with elimination procedures, steam boxes—moist, hot pack and mild specific medication (gr. j or gr. II. of K. I. t.i.d. in milk, with small doses of mercury), that the course of syphilis can be shortened and the general health kept in good condition.

Winternitz also claims that syphilitics are relatively exempt from recurrences or tertiary symptoms when treated with hydriatric measures along rational lines. Some observers have expressed the opinion that indiscriminate dosing with mercury may be the cause of cerebral and spinal lesions (tabes, paresis) following insidiously after many years after an attack of syphilis. The fact that the combined stimulating and eliminating measures of hydrotherapy render *massive dosing* with drugs unnecessary

should be hailed as a blessing by syphilized mankind. At Aix and Burscheidt the use of hot sulphur baths, combined with weak hypodermics of mercurial preparations, are at this writing the favorite treatment in this protean disease.

MALARIAL OR INTERMITTENT FEVER

The discovery of the specific organism, the hematozoon of Laveran as the cause of malaria and the probable transmission of the parasite by means of the anopheles mosquito, renders the prophylaxis for this infection a matter of certainty. That intermittent fever may also be transmitted by means of bedbugs or fleas has also been asserted by several investigators. The infection must be treated symptomatically.

Shower baths with mild douching of the enlarged spleen between attacks act favorably and produce diminution of the size of the spleen. Cold sitz baths with spinal ablution applied daily as a tonic between attacks, render the organism better able to withstand the infection. The stage of chill is usually not treated, as it has been found that warm baths given during this period produce exacerbations of the subsequent fever. The stage of heat is treated with the cold, moist pack, followed by cold ablutions or shower baths.

In chronic malaria or Malarial cachexia mild stimulating procedures—half baths, shower baths with appropriate massage, are beneficial.

The cold abdominal bandage should be continually worn and changed every 2 or 3 hours. If enlargement of the spleen and liver is marked, alternate local hot and cold compresses applied for a long period (10 minutes hot, 1 minute cold) is beneficial. Water, or preferably fruit juices must be taken in large quantities (one gallon daily) for their hematinic qualities.

CHOLERA ASIATICA

Koch's comma bacillus having been identified as the bacterial factor in this toxemia, the fact has also been determined that its ravages attack only such persons whose physical condition

is below par or offers a suitable soil for bacterial propagation. The well-known experiment of *Professor Pettenkoffer*, who ate a sandwich covered with a culture of *Koch's spirillum* and felt no ill effects from his adventure, proved this point conclusively. During cholera epidemics, a general course of tonic procedures, ablutions, baths and douches with imbibition of germ-free water acts as a prophylactic.

When an attack is diagnosed, the patient is placed in a warm bed and placed in a dry, hot pack which is followed by quick, cold ablutions. If diarrhea has supervened, cold rectal irrigations are indicated after each movement, and if the diarrhea becomes exhausting, prolonged cold sitz baths, 30 minutes, can be used for inhibitive purposes. The cold abdominal bandage should be applied and changed half hourly between major hydrotherapeutic measures. When the patient becomes comatose and algid the hot blanket pack, for 20 minutes, followed by a prolonged hot bath, acts favorably in relieving the system of toxins. Frequent rectal irrigations and retention enemata (if possible to retain same) assist in diluting the toxins and in eliminating the bacterial invaders.

The drinking of large quantities of water with fruit juice, especially *currant juice*, is advocated by the late *Doctor Kuhn*.

Yellow fever and the Bubonic Plague must be treated along similar lines to cholera, the symptoms being combated on the principles outlined in the foregoing lectures.

LA GRIPPE. INFLUENZA

The toxins of the bacillus of *Pfeiffer* quickly causes a sensation of depression and overwhelm the vital resistance of the patient in short order. In several epidemics the writer has invariably hurried restoration to normal conditions by adding to appropriate medication the eliminating hot, half or full baths, which relieve soreness of the muscles, cause relaxation, and if followed by stimulating cold ablutions act favorably on the circulation. The baths are given every 4 or 6 hours, the patient wearing a cold cloth about the head during the bath and drinking hot fruit juices (lemonade, currant juice, pineapple juice)

during the immersion. The bath should be prolonged for 20 to 30 minutes, starting at 95° and gradually increasing to 105° F. In the aged, in children and in persons with cardiac lesions the half bath must be substituted for the full bath, and between baths in all cases, the cold, stimulating compress over the pre-cordial area (renewed every 20 minutes) stimulates the heart muscle and cools the blood flowing through it.

Patients treated with hydrotherapy in La Grippe rarely have complications follow an attack. If influenza-pneumonia threatens, the cold vest or cold thoracic compress must be applied between the hot baths. The cold, abdominal bandage must be worn continuously between treatments and changed when warm (often every 20 minutes). It obviates cerebral congestion and stimulates the diaphragm.

CEREBRO-SPINAL MENINGITIS

This is another disease in which the toxins of the invading bacterial host quickly overwhelm the economy. The patient should be isolated and prompt treatment instituted. To secure relaxation and elimination of the toxins, the hot, moist blanket or linen cloth pack should be given at once, followed by ablutions with water at 100° F. The prolonged hot bath (20 minutes) is also indicated. During a recent epidemic in New York, the writer observed two cases treated along hydrotherapeutic lines with success, the technic being as follows:

At the first visit, the hot, moist blanket pack was applied with a preliminary clearing of the bowels with a hot enema. After the hot pack, which lasted 20 minutes and produced marked relaxation, the patient received sectional hot ablutions and was rested for one hour. We next applied hot half baths every 3 hours, with cold affusions to the spine and vigorous rubbing of same, the patient during all these procedures wearing a cold, moist cloth about the head to relieve cerebral congestion. Each hot half bath lasted 15-20 minutes and was *preceded* by hot colon flushings.

Hot liquids were administered regularly every hour, excepting when the patient appeared comatose. This latter condition

usually improved after the hot baths, so that deglutition was possible at times.

Between treatments the patient was wrapped up very warmly and an ice compress placed over the precordial area (renewed every 15–20 minutes) to stimulate the heart muscle.

The principal point in this lethal affection, as in all severe toxemias, is to keep the skin very active by means of hot applications for eliminative purposes and also to prevent internal visceral congestion. In addition, stimulating measures—cold compresses over the heart area—cold affusions and rubbings of the spine and the cold compress about the head must be indulged in to stimulate and preserve the integrity of the nervous and circulatory system.

The writer particularly values the hot colon flushings in connection with the hot half baths, and they should not be omitted as a preparatory measure, as reaction is much more quickly secured than when they are not applied. In giving the hot half baths, an abundance of hot water must be at hand so as to keep up the temperature of the water, which is quickly lowered after the cold spinal affusions.

Rubbing of the spine with pieces of ice can be substituted for the cold affusions, if the supply of hot water is limited. This affusion is usually given three times during the bath and lasts but a few seconds at a time. If the ice rubbing is substituted it should be employed for 2–3 minutes, with an interval of rest, and repetition three times during the bath.

The suggestion of *Dr. William Tod Helmuth*, New York, to employ the *trephine* in these cases in order to relieve intracranial pressure, deserves more attention than it has received. The results in cases where this mechanical aid has been tried certainly warrants further trial of the method.

The recent encouraging reports following the use of the *Flexner-Jobling* antitoxin in cerebro-spinal meningitis, if corroborated, will tend to materially lessen the appalling mortality in this disease. When the antitoxin is employed there is no contraindication for above hydriatric aids, in fact, restoration to health should be hastened by the combination of the two.

SCARLET FEVER

The toxic effects of this infection are well recognized by most practitioners, its preference for attacking the skin, kidneys, throat and ears being disastrous in many cases. As soon as the patient is seen, the eruptions must be encouraged by means of hot, dry packs followed by ablutions of warm water—gentle friction. The patient is given one pint of hot liquids (preferably fruit juices) hourly until diaphoresis and diuresis is well established.

When the eruption is developed, *Doctor Kuhn* recommended prolonged full baths of 90° F. with gentle rubbing during the immersion. Chilling of the skin must be avoided in giving these baths as dermal function must be kept up at all hazards. The baths are prolonged for 20–30 minutes and the original temperature of 90° is gradually, owing to the duration of the bath, diminished to 75°–80°, no hot water being added to keep up the given temperature. During the immersion the patient is given liquids either hot or cold—preferably, fruit juices—and a cold cloth, frequently changed, is wrapped about the forehead and head. This bath is repeated every four hours.

In somnolent or comatose conditions cold rubbing of the spine with ice while the patient is in the warm bath, is indulged in. When baths cannot be readily given, hot sectional ablutions (three times at one seance), followed by a short, cool sponging—this technic being repeated four times daily—is followed by improvement of the symptoms. When hydrotherapy is employed kidney lesions are either mild or absent. If the urine becomes scanty, the hot colon flushing must be thought of or alternate hot and cold compresses over the kidney region applied.

For complications of the throat, the cold compress frequently renewed (every 20–30 minutes) produces local hyperemia and improvement. In cases where relaxation is desired, the alternate hot and cold compress acts best—the hot compress for 10 minutes, the cold compress for 5 minutes—producing improvement in the pharyngeal condition within a short time. Between baths or ablutions it is desirable to apply the cold

compress over the cardiac area, renewing the cloths every 15–20 minutes. It is well to keep up the warm baths fully one week after the patient's recovery, bathing morning and afternoon, and avoiding chilling of the skin in all treatments.

MEASLES

The infection of measles is usually followed by resolution in short order if complications can be avoided. Lesions of the eyes, respiratory tract and heart are its most frequent sequellæ. The bath at 90° F., for 20 minutes, advocated for scarlet fever, is also beneficial in measles. It is given two or three times daily, and between the baths the patient wears the cold, abdominal bandage for its derivate effect and its reflex stimulation to the respiratory function. The abdominal bandage is changed only when it becomes dry and warm—with cases of ordinary fever every 30–40 minutes.

When bronchial irritation is noted, the triangular bronchial cold compress renewed every 30 minutes is employed. If there is difficulty in raising mucus the alternate hot and cold triangular compress—hot 10 minutes, cold 5 minutes—is employed until improvement pertains.

Fresh, pure air is essential, and the drinking of fluids should be encouraged. The patient when apparently well must be treated like the scarlet fever case and kept under surveillance and treatment for one week longer, as frequently the sequellæ occur from too early exposure and lack of supervision on the part of the physician.

SMALL-POX—VARIOLA

The writer has not had occasion to treat small-pox, and desires to quote the measures recommended by the late *Doctor Kuhn*, who had considerable experience in this disease.

As soon as the patient is seen, for the relief of the initial fever, lumbar pains and vomiting, a prolonged warm bath, 95° F., is administered, with the cold abdominal bandage applied between baths, which are given every 4 hours.

When the eruption has appeared the cold, moist pack repeated twice a day is indicated, to be followed by quick, warm ablutions. Enemata of cold water should be given daily, and an abundance of cold water or fruit juice imbibed. With the development of the pustule, the emunctorial function of the skin must be stimulated as much as possible, and in place of the cold, moist packs the writer would recommend the *Wernitz* colon flushing method, repeated every 3-4 hours, to be alternated with hot half or full baths and the imbibition of an abundance of pure water.

To prevent pitting, the patient should be kept in a dark room or a room screened with red shades, the hands immobilized and the burning, itching skin relieved by alternating hot and cold compresses.

In cases of coma the colon flushing method or the hot blanket or linen moist pack must be called to aid.

CHICKENPOX AND RUBELLA

Both of these minor diseases must be treated symptomatically, the prolonged, warm bath, 90°, for 20-30 minutes, given daily or twice a day when temperature is high, acting favorably. Complications or sequellæ must be treated along the lines described under *Scarlatina* and *Measles*.

The abdominal cold bandage acts well in both diseases and should be worn as long as temperature persists, being changed every 30-40 minutes, whenever it becomes dry and warm.

MUMPS—PAROTIDITIS

Hydrotherapy assists in hurrying resolution in this infection by the application of *half baths* at 90° F., continued for 20-30 minutes, twice a day.

Ice compresses over the swollen parotid gland, renewed every five minutes, will inhibit the spread of the inflammation. When the swelling has been checked, the alternate hot (15 minutes), followed by the short, cold stimulating compress (5 minutes), tends to restore normal circulatory conditions with absorption.

In metastasis to the breast, apply hot compresses every 10-15

minutes with short, cold ablutions between renewals, until the pain and swelling subsides. Sometimes the inhibitive and analgesic effects of continued cold must be invoked.

In metastasis to the testicle, especially if pain is severe, the inhibitive cold compress or ice compress must be applied. When the pain and swelling subsides, the alternate hot compress followed by short, cold ablutions is serviceable.

TETANUS. (LOCK-JAW—TRISMUS)

This infection, particularly encountered after Independence Day festivities, is so deadly, its poisons particularly affecting the nervous centers and the kidneys, that until the advent of serum-therapy few or no cases were saved. The principles on which hydrotherapy can be employed as an adjuvant to medicinal agents should consist in powerful eliminative measures and tonic nerve effects. The colon flushing method with hot water, repeated hourly until copious perspiration and diuresis was achieved, would appear to the writer to deserve trial.

The hot, moist blanket or linen cloth pack, must also be borne in mind. In addition, cold compresses over the precordial area to add tone to the heart muscle and quick, cold sectional ablutions after each heating procedure, appear indicated. The prolonged hot bath will produce relaxation and elimination—and if followed by short, cold ablutions, nerve tonicity can be stimulated.

ERYSIPELAS. ST. ANTHONY'S FIRE

The specific streptococcus associated with this disease and its elaborated toxins are readily combated by hydrotherapy and convalescence is shortened materially if its aid is invoked.

Cold sectional ablutions every 3 or 4 hours, to produce general tonic reaction, is indicated. Locally the cold compress, renewed as soon as it becomes *dry* and *hot*, must be religiously employed. At the beginning, with the temperature ascending, these compresses must be renewed frequently, every 5-8 minutes. Ice or ice compresses must be *avoided*, as necrosis may be induced.

If the kidneys become affected, the colon flushing method—water at 70°–75° F.—repeated frequently until diuresis is established, must be called to mind. Complications or sequellæ during or following the infection, must be combatted on the principles outlined in the previous chapters.

Professor Bier's recommendation to produce *passive hyperemia* of the parts attacked by erysipelas by means of rubber bandages and through dilution of toxins and local increase of antibodies and antitoxines and phagocytes (coincident with the local stasis) cure the disease, has been favorably commented upon. In hydrotherapy similar results are obtained by increased *fluxion* to the parts with the same resulting therapeutic auto-genous agents.

DIPHTHERIA

Although present medical methods of combating the established lesion associated with the *Klebs-Loeffler* bacillus have robbed this disease of its former great mortality, the combination of hydrotherapy with appropriate medication assists in the prompt elimination of toxins, protects and conserves the integrity of the nervous system and obviates many sequellæ.

The colon flushing method repeated every 2 or 3 hours in the *early* stages, when the patient can be freely handled, is indicated. The imbibition of half a gallon of water per diem assists elimination. Pineapple juice appears to act particularly well in diphtheria, and should be given in quantities with the water. Inhalations of steam well saturated with pineapple juice assist in the detachment of membranes and should be given *early* in the disease.

Locally, *cold* compresses renewed every 20 minutes, assist in stimulating local leucocytosis and resolution is hurried. The compress must fit very *snugly* about the neck so as to produce local hyperemia of a tonic character. Cold, sectional ablutions repeated every 3 or 4 hours, assist in stimulating the nervous system and the heart. Between treatments the cold compress must be applied over the heart as a tonic.

In threatened suffocation the hot, full bath given for 10–20 minutes, with *cold affusions* over the back of the neck and

upper dorsal spine, must be quickly applied. The cold affusions stimulate the respiratory center and tone up the heart.

In paralysis or neuritis, hot applications over the affected nerves must be applied for 20 minutes hourly, with subsequent quick, cold ablutions. The use of ice-cold water which was sprayed over the membrane in the throat, the patient expectorating as soon as the cold water touched the throat, was a favorite method of the late *Doctor Kuhn* in loosening the membrane. He claimed that the very cold water produced marked contraction of the muscles with detachment of the membrane, and if the patient co-operated and quickly expectorated the loosened particles, the throat was cleared quickly. This spraying with the ice-cold water was repeated half-hourly until improvement set in.

TONSILITIS

Tonsilitis, although apparently a local minor infection, *nevertheless causes general toxemia*, and patients should be isolated in this disease as in all the foregoing infections.

The eliminating and sedative hot bath relieves the sensation of general soreness and lethargy, and the cold local neck compress, carrying the bandage over the head and fitting same over the ears by means of a slit in the cloth, as advocated by *Dr. Simon Baruch*, should be applied. This compress is renewed every 20-30 minutes. The hot bath, 100°-102° F., is usually prolonged to 15-20 minutes, and should be followed by a quick, cold ablution. Gargles of cold water every half hour act favorably in inducing local tonsillar hyperemia and resolution.

The inhalation of steam also induces local hyperemia and loosens the discharges and clears the lacunæ of débris. Copious drinking of fruit juices and a daily cold enema act well in conjunction with above measures.

CHAPTER XX

AUTO-TOXEMIA

The studies of *Lahmann*, *Bouchard* and *Combe* on auto-toxemia and the irresistible facts these authors have arrayed on the subject, compel increased attention to the physiological processes of the body and their deviations from the normal. The writer is in full accord with the general trend of argument contained in *Lahmann's* masterpiece (*Die Kohlensaurestaung in unserem Koerper die wichtigste allgemeine Krankheitsursache*) and is also a follower of *Bouchard* and *Combe* in the majority of their deductions in regard to auto-intoxication as a cause of disease.

Lahmann's "Carbonacidemia," as a prolific cause for disease, has been tested by the writer for several years, and results have confirmed the hypothesis abundantly.

CARBONACIDEMIA

The subject of carbonacidemia is, to our knowledge, not touched upon in medical textbooks, so that the writer desires to quote from a paper read before the New York Physico-Therapeutic Society and the Academy of Pathological Science, what the term carbonacidemia comprises and to give incidental therapeutic suggestions.

In discussing this subject in this pamphlet (*Die Kohlensaurestaung in unserem Koerper die wichtigste allgemeine Krankheitsursache*) Doctor *Lahmann* gives a physiological review of the carbon dioxid cycle, which it will repay us to consider. In the first place, he emphasizes the fact that the oxygen intake into the lungs and the carbon dioxid exhaled have no direct relationship. Oxygen is taken up by the hemoglobin of the blood

and carried to the tissues; the latter excrete carbon dioxid which combines with the sodium contained in the blood, which salt, principally as sodium bicarbonate, is, by means of diffusion and chemical change excreted through the lungs and skin.

It is the common belief that arterial blood is comparatively free from carbon dioxid and that venous blood is charged with carbon dioxid. This is a mistake. All recent physiologies tell us that while the veins carry more carbon dioxid than the arteries, the relative difference is not very great. All observers agree that at night CO_2 increases in the circulation owing to diminished respiration and consequent diminished pulmonary exchange. The greater the tension between the blood supply in the lungs and the atmosphere, the greater the relative exchange. As sodium forms the principal carrier for CO_2 , it is apparent that when sodium and its compound are diminished in the tissues, less CO_2 is bound, and retention of the gas with toxemia will result. This is obviated to some extent by the CO_2 combining with other compounds, such as phosphoric acid, the albuminates and others which, however, do not compare with sodium in its quantitative combination with CO_2 . The changes in CO_2 excretion are synchronous with the daily changes in the frequency of the pulse and body temperature, the minimum excretion being from 2-6 A. M. This minimum exchange at 2-6 A. M., is due to the superficial and slow breathing during sleep, and the slower circulation of the blood during the night. The fact that CO_2 retention is greatest at 2-6 A. M. explains the marked increase in mortality at these hours. It also explains why most children are born after midnight as CO_2 relaxes tissues and acts as a narcotic. In the morning, on arising, the respiration increases and becomes deeper—one involuntarily stretches and takes deep breaths to get fully awake—and this involuntary act is merely an effort to rid the system of accumulated CO_2 . Later in the morning respiration again is slowed down; after the midday meal respiration is again increased to its maximum.

When the CO_2 excretion increases in the early morning, and in spite of activity, both physical and mental, during the rest of the forenoon, no increase in the CO_2 output is noted, but rather a decrease is registered, *Lahmann* concludes that the condition

of carbonacidemia is present and that during the night the tissues became surcharged with CO_2 .

During the night, when retention of CO_2 causes, through combination with sodium salts, a relative diminution of the latter, other compounds, such as urates and uric acid, whose excretion depends to some extent on their combination with sodium salts, also are thus deprived of this satisfying bond, and are in this way stored up in the system. This point should be borne in mind as explanatory of rheumatic and gouty lesions.

Another feature to be noted from the retention of CO_2 is that the physiological retention of CO_2 during the night produces marked changes or effects on the nerve centers. The surcharged venous blood produces a narcotic, stupifying effect, producing lassitude. This occurs most markedly, as already stated, at from 2-6 A. M., and is frequently ushered in by slight, short chills. This nightly physiological carbonacidemia, through irritation of the vasomotor nerves which control the innervation of the blood-vessels, produces increased arterial contraction and increased blood pressure, and thus physiologically stimulates the retarded night circulation and the excretion of accumulated auto-toxins. This carbonic acid retention and its excitation of the vaso-motors also irritates the respiratory centers and increased action in the lungs take place with coincident increased excretion of the accumulated CO_2 in the pulmonary tissues.

It has been noted that not only the vaso-motor centers are stimulated by the presence of CO_2 , but that the walls of the blood-vessels contract as soon as the circulation becomes markedly venous in character.

On arising, the contact of the skin with the air of the bedroom contrasted with the warmth of the bed, produces an irritation of the vaso-constrictors, which contract the arterioles of the skin and also its deeper branches reflexly. Now, as we have seen, the CO_2 in the morning contracts through irritation of the vaso-motors the blood-vessels of the interior also, and this double action produces the sensation of numbness and stiffness, which is especially noticeable in cold days, and is most marked in the joints, fingers and toes.

This physiological arterial morning contraction of the blood-

vessels is particularly increased in individuals whose metabolism is faulty and who, from alimentary auto-intoxication, have diminished respiratory and dermatological reaction.

When this condition becomes chronic there ensues diminished circulation in the joints and coincident increased venous overloading with CO_2 , as the arterial circulation is less liable to circulation stasis than the venous owing to its more rapid flow.

Reynaud's disease is a condition where such features have reached the ultimate stage. The next group is formed of persons who have bluish-red hands and who suffer from frostbites and chilblains in the winter with numerous changes in the integrity of the skin, evidenced as papules, pustules, carbuncles, eczema, etc. A large number of individuals have cold hands and feet as a chronic ailment. These symptoms are relieved by warmth and by exercise during the day, to return again at night. When carbonacidemia is marked and the arteries contracted reflexly, the veins, owing to increased pressure become distended—this is especially noted in the dependent parts. The veins contract to a certain extent until through reflex pressure further contraction is no longer possible, and then permanent distention takes place and lesions, such as hemorrhoids, varicose veins, uterine and nasal hemorrhages are produced.

Serous exudates from the veins are also a consequence of venous stasis, and catarrhal lesions of all parts are invited through this discharge.

Another feature noted is that when carbonacidemia exists and the veins are surcharged with CO_2 the usual absorption of CO_2 in the alimentary canal is interrupted, and gases accumulate with resultant meteorism, distention, colic and other symptoms due to collection of gas. Most cases of so-called nervous and flatulent dyspepsia are referable to the above cause. This distention of the venous radicles also prevents the usual absorption of fluids and causes retention of same in the tissues, the well-known baggy eyelids being a manifestation of this condition. Stasis of the pelvic organs also results from the same venous overloading with backache and reflex irritations of various kinds.

Carbonacidemia also explains the relative increase of anemia in women, compared with men. The male sex excretes $33\frac{1}{3}\%$

more CO_2 than the female, from the eighth year to old age. After the climaxis, the female excretion approximates that of the male of the same age.

There are, as is well known, about 500,000 fewer erythrocytes per c. c. in the female circulation than in that of the male. Hence, there is diminished oxyhemoglobin and less of CO_2 excretion. Nature has placed the metabolism of women at a lower scale so that during pregnancy and lactation women can have an increase of function. If metabolism in the female was placed at its maximum at all times it would be impossible, without detriment to the organism, for the mother to stand the demands of increased metabolism coincident with childbirth. At the time of puberty the CO_2 excretion of the female is about one-half that of the male, and when this is combined with sedentary habits, improper diet and unsanitary surroundings it is not surprising that anemia and chlorosis are so common with the fair sex. In fact, women are by nature destined to be subject to diseases due to CO_2 retention, and only vigorous measures can obviate them.

In consequence of CO_2 toxemia women have poorer circulation than men; they have a cooler skin; retain more water in their tissues and are usually more readily affected with disease than men. Goiter is more frequent with them, and cystic conditions of the breasts and ovaries are common. Myopia is also more common. Through retention of urates, uric acid and other toxins produced through carbonacidemia, women also furnish a majority of the cases of gall-stones and rheumatism and gout. Improper dress, the use of the corset with narrow waists increase these drawbacks, as pressure about the hips prevents the return flow of the blood from the lower extremities and pelvis, with consequent venous stasis and increased carbonacidemia. Pressure upon the thorax also prevents diaphragmatic breathing and respiration of the lower lobes of the lungs, and consequent diminished CO_2 exhalation. The absurdity of having women who suffer from such conditions as outlined above take a rest cure must be apparent to all. In spite of seeming and even true weakness and lassitude, these patients must be treated vigorously; breathing exercises, walking, gymnastics, golf, sports of

all kinds must be advised, with properly-conducted baths to stimulate the peripheral circulation. These measures must be carefully supervised, and rest prescribed between exercises as part of the treatment.

The relationship between carbon dioxide retention and uric acid has been touched upon; uric acid and urates cannot be excreted when an excess of CO_2 is present in the blood, as the CO_2 uses up the sodium bases required for the urate and uric acid precipitation.

It is clear, therefore, that instead of combating uric acid we must first direct our attention to CO_2 retention before we can, in any way, ameliorate conditions due to uric acid or urate deposits. Carbonacidemia also explains why gout preferably attacks the hands and feet.

As the circulation is most readily checked or hindered in the joints with coincident stasis, the CO_2 which collects combines with the sodium of the tissues and the urates are deposited and not carried off through the lack of sodium in the blood which the CO_2 has pre-empted. When these individuals who suffer from carbonacidemia for three-quarters of the day during the cool and cold seasons are thus attacked, their joints become natural repositories for these gouty salts. A warm climate is, therefore, always most beneficial for such patients.

Rachitis is also due to carbonic acid surfeit in the blood. The increased CO_2 combines with the calcium salts of the epiphyses of the child and prevents proper development of the bony system. Thus a child living in closed rooms with lack of oxygen and improper metabolism must have increased CO_2 retention, and will invariably, if continued in such surroundings, develop rachitis. In Japan, rachitis is unknown, as the children live in bamboo houses, with little or no clothing, lead an active outdoor life, and CO_2 toxemia is, therefore, excluded.

Many cases of epileptiform and other convulsions are referable to CO_2 retention. It is noted that previous to an attack of epilepsy the urates are diminished (due to CO_2 retention and consequently robbing the blood of sodium). It is also noted that most cases of epilepsy occur during the night and morning when CO_2 retention is at its height.

Neurasthenics are also sufferers from the same fundamental cause—they are worse in the morning, sleepy and never fully rested and only wake up and become bright toward evening, when a certain amount of CO_2 has been eliminated.

Cramps of the muscles, yawning, the desire to stretch, are all manifestations of the same cause. The anemic and chlorotic patient suffers from chronic CO_2 retention. When this toxemia is increased, they faint or become hysterical reflexly and have convulsive attacks due to irritation of the medulla. Their respiratory center is irritated through the slightest bodily exertion, and they suffer from shortness of breath. They have constant irritation of the vaso-motor centers through CO_2 retention, a deficient peripheral circulation with pale or puffy skin, increased frequency of pulse and with it (owing to obstructed capillary circulation) cardiac weakness which is enhanced during fevers and which is frequently followed by edema of the lungs.

Edema of the lungs is produced when the heart becomes weak after fevers where CO_2 retention is marked and the vaso-motor centers are unduly irritated. Distention of the pulmonary veins takes place and serous and watery transudates fill the vesicles of the lung. The left ventricle becomes exhausted through its attempt to overcome arterial tension caused by CO_2 retention, and when weakened there is a backing up of blood in the pulmonary veins with consequent flooding of the tissues. Physicians know by experience, in pneumonia and other diseases of excessive CO_2 toxemia, that the heart is of more vital importance than the lungs themselves, and above explanations clear up the wherefore of this clinical fact.

A large number of people are classed among the healthy, as they do not complain and appear well-nourished. These individuals look plump and have a superabundance of subcutaneous fat. When they are attacked by disease they are surprisingly quick prey to death, owing to the rapid elimination of fatty acids which combine with sodium salts and rob the blood of its CO_2 carriers, thus producing CO_2 retention and the train of symptoms already detailed. These individuals usually have poor teeth, suffer from rheumatism, gout, diabetes, nephritis and organic nerve lesions. They are also subject to cardiac lesions,

softening of the brain and other diseases of the central nervous system.

From what has gone before, it must be apparent that the usual dietary of heavy breakfasts so much in vogue in the United States is particularly unhygienic and harmful. The body has all it can do to excrete the nightly accumulation of carbon dioxid, the urates, uric acid and other products of waste without being called upon to take care of the toxins provided by a meat and egg breakfast. In making these statements we are aware of running counter to fixed habits, but on careful investigation the subsequent deductions will be approved by all who look into the matter. The so-called American breakfast is the foundation of many cases of rheumatism and gout, and individuals who indulge in them are in the morning hours dull, listless and slow, and their ability to do things increases as the day progresses, and they have by exercising eliminated some of the toxins, including CO₂. Heavy breakfasts can be tolerated only by individuals who are much engaged in the morning hours, especially if in the open air, and even these individuals will eventually pay the costs for this dietary indiscretion. Convulsions are in many cases due to CO₂ retention, and the best remedial measure, if this basic diagnosis is suspected, is to place the patient in a hot bath for five to eight minutes and stimulate the respiratory centers with cold application to the nape of the neck or by rubbing the cervical spine with cold water, so as to excrete the accumulated CO₂ through the lungs and skin.

It is recommended as a general measure to prevent CO₂ retention that patients take air baths; *i.e.*, exercise in a naked condition or clothed in wide-meshed linen gowns in their rooms (which must be well ventilated) or in the summertime walk about naked or loosely gowned in the open air in properly enclosed spaces.

Bathing exercises, diaphragmatic exercises are combined with these air baths, and sawing wood, chopping wood, golf, walking, swimming, swinging Indian club and dumb-bell exercises are recommended.

A dietary should be selected so as to combine sufficient nitrogenous with carbohydrate and fatty constituents, and especial

care must be taken to consume sufficient sodium and calcium salts to neutralize the usual excess of nitrogenous principles found in the ordinary obtainable food-stuffs. These salts are found in greens—lettuce, cress, salads and fruits of all kinds—and these should be consumed in abundance in combination with the meats, eggs and fish which are found indispensable in the usual dietary. Spices are prohibited. Lemon juice is substituted for vinegar. A mixture of ordinary salt triturated with calcium phosphates and sodium phosphate has also been suggested as a seasoning.

Water is prohibited at meals, but may be taken between meals *ad libitum*. Alcohol is forbidden. Nuts and cereals are also favored dishes. Warm daily baths followed by a cold douche are excellent for these conditions. The bath should be taken at 95° to 98° F., for fifteen minutes, with a brisk sponge or a cold douche.

This bath is recommended as the best bath for health, and is to be distinctly preferred to the matudinal cold plunge or tub.

In severe cases the dry pack given twice a week, followed by the short, cold full bath (1 minute) or a quick, cold ablution tends to restore dermal integrity and stimulate the peripheral "heart." The blood-vessels of the periphery show the reaction by an increase of the color of the skin, and the general action of the pulse also responds to this measure.

Sleeping in cold, well-ventilated rooms, or in tents, during suitable seasons, is enjoined, and in pronounced cases of carbon-acidemia the daily irrigation of the lower bowel with normal salt solution has been followed by a good reaction.

Linen-mesh—wide-mesh underwear—is an adjuvant to these measures, as it permits radiation of heat and also exhalation of the products of the sudoriparous glands. The skin exhales normally about $\frac{1}{16}$ part of carbon dioxide given off by the economy, the lungs being the main exit for this excretion. By keeping the skin active, this percentage can be increased materially. The drinking of physiological salt water once or twice a day is recommended by some observers, with the view of furnishing the blood with sodium in solution to act as CO₂ carriers.

The curative effect of many so-called "healing springs" may

possibly be referred to the sodium salts held in suspension, which assist in eliminating CO_2 toxemia.

When carbonacidemia is pronounced, fasting in the morning is an excellent measure. The eating of merely a light cereal with milk and fruit is recommended for breakfast, the main meal, mixed diet, with an abundance of green vegetables, being preferred at one or six P. M.

The writer (contrary to former teachings on this subject) favors the liberal ingestion of fruits in all cases of auto, bacterial or parasitic toxemias, as the *alkalinity* of the blood is enhanced and with it its bactericidal properties.

Much more can be written on this exceedingly interesting topic, but space forbids. We have experimented with the carbonacidemia theory of *Doctor Lahmann* for the past three years, and have formulated these conclusions from added personal observations. Cases which formerly baffled us now appear to react promptly when carbonic acid retention is found as a basic cause and treatment instituted accordingly, and the profession is invited to carefully consider the arguments given, and if in harmony with their understanding apply the remedial measures in their practice.

In addition to carbonacid toxemia, *Bouchard* and his followers point out various other causes for auto-intoxication, the main excretion for which are the emunctories. It is asserted that hyperactivity and insufficiency of the liver, pancreas, kidneys, in fact all or any viscera or ductless glands, induce disease or symptoms of distress directly referable to auto-intoxication. As insufficiency and hyperactivity of any organ is directly referable to disturbed blood supply of the part involved, the remedial measure to be invoked must restore, if possible, normal circulation of the part before improvement can be expected. This may comprise, first and foremost *rest*, then mechanical measures such as correcting deformities, or by correcting the blood stream by appropriate exercises or physical measures comprised in hydrotherapy—heat and cold—by means of which we can augment or inhibit or regulate the supply of blood to any part to be treated.

The subject is such a broad one that the compass of these

lectures precludes going into each separate instance of visceral insufficiency or hyperactivity, and we must refer to *Bouchard's* classic lectures (*Bouchard; Auto-intoxication in Disease*) for the detail of these hypotheses. Treatment in all cases can be guided by the principles outlined in the chapters on the physiological action of water, including heat and cold, and their action upon the secretive and excretive properties of the emunctories, the kidneys, the liver, intestines, the lungs and the skin. It is through the latter particularly that the hydrotherapist secures increased elimination of toxins when auto-intoxication pertains. The groups of visceral diseases will be treated in subsequent chapters.

PTOMAIN POISONING

The symptoms of ptomain poisoning—vomiting, diarrhea, collapse, subnormal temperature—are readily combated by hydrotherapy. Nature's method of ridding the economy of the tox-albumins by means of vomiting and diarrhea should be encouraged. Lavage of the stomach to clear out the gastric contents, colon flushing and irrigations to clear out the ptomaines from the intestinal tract, and drinking *large quantities of water* (the latter with weak solutions of potassium permanganate 1:5000 to increase oxidation of the débris) should be promptly applied. To combat the collapse and at the same time increase the elimination of the skin, warm, full baths, 98°–102° F., for 30 minutes, with moderate friction, are employed.

The cold compress over the precordial area must be employed as a cardiac tonic, renewed every 30 minutes. The larger the quantity of water absorbed, either per os or per rectum, the better the resultant dilution and elimination of the poison. Prescribe a goblet of water every 15 minutes—make it tepid at the beginning to induce emesis and *hot* for sedative and solvent purposes later on. If the stomach revolts, the colon flushing method will be serviceable, the rectal tube being lowered whenever alvine discharges appear and renewed irrigations applied whenever possible. As soon as the cold skin becomes moist and perspiration of an eliminative character is established, the repeti-

tions of the flushing can be diminished, but until this reaction sets in, constant irrigations should be essayed.

CHRONIC MERCURIAL POISONING. MERCURIALISM

Workers in mercury frequently develop toxic symptoms with skin eruptions and ulcers closely resembling typical luetic lesions. Overdosing with repeated prescriptions of bichlorid and other preparations of mercury leading to ptyalism, glandular enlargements, dermatoses, and intestinal and visceral disturbances of various kinds demand prompt eliminative measures. Hot-air baths followed by quick, cold ablutions favor elimination.

The dry pack followed by short, cold ablutions, and this procedure followed by repeated and prolonged hot baths, the time and repetition depending on the case, offer other means for elimination. The drinking of milk and albuminous liquids or rectal irrigations of same (especially in corrosive sublimate cases) are antidotal and eliminative. The dosage and irrigation must be gauged by the case, but treatments must be continued for a protracted period to make certain of definite elimination.

CHRONIC LEAD POISONING. PLUMBISM

Chronic lead poisoning, owing to the increased consumption of canned goods and accidental ingestion of small and minute particles of solder, also due to the large consumption and handling of this metal in the trades, is more frequent than is usually assumed. The writer has also traced cases of acute colic to the probable ingestion at various times of the thin pieces of foil surrounding the chocolates so popular with children.

In acute cases the ingestion of 4 or 6 goblets of *very weak* sulfuric acid (dilution 1:100,000), "lemonade," acts favorably.

In chronic cases hot rectal enemata, retained as long as possible, lessened the colic and produced free movements of the bowels. These hot enemata were repeated three times daily. The patients were also advised to take two hot full baths daily, 100°-102° F., the immersion lasting 20-30 minutes. In

one case the patient felt so well after the bath that he prolonged his immersion over one hour.

If these relaxing and eliminating measures are continued for several weeks, the blue line on the gums, the spasms, colic and constipation will disappear and in due time the dermal circulation will be restored and cachexia be absent.

CHRONIC ARSENICAL POISONING

The inhalations of arsenical particles from wallpapers in closed rooms, the handling of dyestuffs and furs preserved in arsenicum frequently cause acute or chronic arsenical toxemia. The use of Paris green on certain vegetables and berries (to destroy worms) may also be the cause of occasional distress after eating these substances, through absorption of minute particles of the poison. The writer has treated two cases of arsenical poisoning in makers of artificial flowers (paper), one of whom developed a typical herpes zoster. Another interesting case at the Flower Hospital, which, until the etiology was discovered, puzzled the internes and attending physicians, was that of a furrier who, whenever he handled a large number of furs, developed symptoms of poisoning. He was brought in *per* ambulance in a state of collapse, and after the use of physiological heart stimulants and rest, the anamnesis was taken and the clear picture of all the symptoms of arsenical toxemia appeared.

Chronic arsenical toxemia must be treated on similar lines to all other toxemia—hot packs—hot air baths followed by quick, cold ablutions, or hot full baths of moderate duration are serviceable. In addition, water must be added to the circulation *per os* and *per rectum*, and if necessary, the repeated *Wernitz* colon flushing with hot water employed until copious perspiration and diuresis is secured.

ALCOHOLIC TOXEMIA. DELIRIUM TREMENS

In acute or subacute alcoholic toxemia, lavage of the stomach is beneficial—the use of moderately warm water being preferred. Cerebral congestion is combated with cold compresses about the

head and neck, irrigations of the rectum and the cold abdominal bandage—the latter renewed every 3 hours—act well. Prolonged warm, 95°–98° F., full baths also act kindly in producing relaxation and elimination. Chronic catarrhal gastritis is combated with the ingestion of hot water, one goblet every three hours, or if this becomes nauseous, the hot rectal irrigations must be substituted. Half baths given twice daily, at 80°–85° F., also act well by reflexly relieving the cerebral congestion. Cardiac weakness must be treated with the cold compress renewed half hourly. In chronic cases the cold moist pack, followed by a quick cold full bath or cold ablution given twice a week, assists the other measures.

Electric light baths and hot-air baths can also be called to mind for eliminating purposes.

Delirium Tremens supervenes when the kidneys fail to perform their function. It is, therefore, due to the toxic effects of alcohol plus the toxemia of renal insufficiency. The prescribing of material doses of poisonous drugs—so-called “dope”—to quiet these patients seems, therefore, to be illogical and irrational. The efforts should be directed to cause elimination of the toxins causing the symptoms of delirium and tremor. Nothing acts so well in these cases as the prolonged hot full bath given for 1–2, even 12 hours at a time, the patient being strapped in a sheet or hammock and suspended in the water at 103°–105° F. for the first half hour, the water temperature being gradually lowered to 98° F., where it remains the rest of the time.

Cold compresses about the head frequently renewed, are essential, and the ingestion of an abundance of water (if necessary by means of the stomach tube or hot colon irrigation) will dilute and excrete the accumulated effete materials stagnant in the circulation. These prolonged baths are repeated for several days until distinct improvement is noted and *no food*, excepting milk and vichy, and an abundance of fruit juices in water should be given for 48 hours. A competent and strong nurse must be constantly in attendance in these cases until the mental and nervous symptoms are alleviated. Between baths the heart coil or cold compress should be applied to improve cardiac action.

NICOTINE OR TOBACCO POISONING

Besides the danger of contracting tuberculosis and syphilis from hand-made cigars, many symptoms referable to the heart, the eyes and the alimentary tract are due to tobacco and its alkaloids.

The best treatment is, of course, to abstain from the use of tobacco. Amblyopia, due to tobacco, is relieved (as detailed under the chapter of Imbibition of Water) by copious water-drinking and exercise in the open air. Sedative baths, 80°-85° F., taken at night before retiring, for 30 minutes, with no cold ablution, acts favorably on the irritable so-called *tobacco-heart*. The drinking of abundant liquids—lemonade, milk and vichy, buttermilk—with low diet for a few days, acts favorably in gastric irritability due to tobacco.

COCAINE, CHORAL AND OTHER DRUG HABITS

These habits must be combated with withdrawal and gradual elimination by means of packs, prolonged warm baths and subsequent stimulating procedures. Strict individualization is required and proper surroundings and mental suggestions are essential to restore the normal status *quo ante*.

MORPHINE POISONING. MORPHINISMUS

Opium and its alkaloids, while a blessing in many cases, has, on the other hand, proven a curse to many individuals through the contraction of the so-called opium or morphine habit. Under the baneful influence of this poison the physical and psychical functions, as well as the whole character of the individual, becomes depraved and ordinary measures of treatment are useless or only of temporary value.

The treatment of acute cases of poisoning belongs to the domain of toxicology—with lavage (potassium permanganate solution) hypodermics of atrophine and hot prolonged baths and hot rectal irrigations.

The slow method of withdrawal in morphine cases is at present the method of choice in sanatoria conducted along rational lines. During the gradual diminution of the daily dose of morphine, stimulating measures subsequent to eliminating measures of a mild degree are employed. The patient is kept busy all day with measures such as the following: On arising a warm shower, followed by a quick, cold shower; then two glasses of pure water or suitable mineral water; following this a brisk walk or exercise for 15–20 minutes. Breakfast—light diet—no meat or eggs; ten A. M., half bath, 85°–90° F. for 20 minutes with cold ablutions to the spine and subsequent gentle massage; rest for half an hour after this procedure. Light lunch; three o'clock, cold foot bath with friction, followed by a short, cold douche or shower and subsequent pedestrian exercise. Six o'clock, substantial dinner. Nine o'clock to bed, with cold abdominal bandage applied during the night.

The patient should always be accompanied by a trustworthy nurse and infraction of rules prohibited—forcibly, if necessary. After three or four weeks the amount of morphine injected should have been reduced to a minimum, and in a few days later normal salt solution should be substituted, and these injections continued for a week longer. During this whole period the vital functions and resistance of the patient will have been favorably acted upon by the various hydrotherapeutic measures, the diet, rest and care, and the patient can be informed that he has had *no morphine* for the past week or more.

The normal salt injections can then be suspended and the patient continue under supervision for a short time before discharging him as cured. Relapses may occur, but the same measures can be again applied, and if the physician is cognizant of the value of suggestive therapeutics, this measure can be added to the treatment. When once thorough health is again enjoyed by the patient and relief from the thralldom of morphine is experienced, the patient soon settles to a life of usefulness. Too often, however, a prescription containing the former drug again sets up the craving, and the same routine must be again gone over to rescue the patient. In these cases the taking of opium in any form—patent medicines, etc.—must be abso-

lutely shunned and the physicians warned concerning the idiosyncrasy of the patient.

SUNSTROKE (INSOLATION) AND HEAT PROSTRATION

The therapeutics of sunstroke and heat prostration differs so materially that a differential diagnosis may be justified at this point.

SUNSTROKE

1. Comes on suddenly with unconsciousness.
2. Face and skin hot and flushed.
3. Pulse quick, either bounding or weak.
4. Respiration either rapid and shallow or labored and stertorous.
5. Temperature 105°-108° F.
6. Due to direct rays of the sun.

HEAT PROSTRATION

1. Comes on slowly or rapidly, with sensation of weakness and partial or entire unconsciousness.
2. Face and skin pale and cool, sometimes clammy sweat.
3. Pulse quick and feeble.
4. Respiration increased.
5. Temperature subnormal.
6. Due to excessive heat in confined quarters.

The clinical thermometer per axilla or rectum will quickly clear up the diagnosis if any doubt exists.

In either case the patient must be placed in a recumbent position in a shady and cool place and prompt treatment instituted.

Sunstroke is treated with cold ablutions and friction to restore dermal function. The rubbing with ice continuously all over the body, employing 3 or 4 nurses at each case, will act beneficially. These cold ablutions and rubbings with ice must be continued for several hours until the temperature and symptoms approximate the normal. Cold compresses over the heart area to stimulate the heart, and ice compresses over the head and forehead to relieve cerebral congestion and obviate meningeal inflammation, must be constantly applied and reapplied, being changed every 5 minutes at the beginning of treatment. The use of the cold-water douche by means of the ordinary garden hose is also indicated. By this means cold plus friction is applied and restoration of dermal and circulatory and nervous

function brought about. The hose treatment must be kept up for half an hour at a time, the spray being moderate in force only. After a short rest, if the patient's temperature still remains excessive, the douching must be resumed until the rectal temperature registers 100°, when the danger point is passed and the patient can be rested. The cold head and heart compresses and the cold abdominal bandage should then be applied and changed half-hourly until convalescence.

In hospital practice, especially when many cases are coming in, the hose treatment is the only practical one and can be conducted in the courtyard or under a tent, the patients being placed on ordinary canvas cots and sprayed as indicated above. Considering the former mortality of this affection, the hose treatment at Flower Hospital in several epidemics gave a mortality of 11% only, which shows a marked improvement in favor of this procedure.

The ice pack or ice bath is to be *condemned* in the treatment of sunstroke, as the excessive cold tends to paralyze the dermal, circulatory and nervous systems and causes exitus letalis. Cold can only be applied when *friction* accompanies same, to induce circulatory tonicity and stimulation of the peripheral and central nervous system.

Heat Prostration requires removal to a cool, shady place, with stimulation of the heart and skin by means of a hot drink, and a warm bath—90°–95° F. This bath, given for 20 minutes with moderate friction, soon restores the patient to a normal condition. The patient should be abluted thereafter three times a day with cold water until convalescence is complete. In lieu of the warm bath, ablutions with hot water and massage may be given for 10 minutes and moderately repeated if the symptoms call for them. These hot ablutions are always to be concluded with short, cold ablutions to restore the tonicity of the peripheral circulation.

CHAPTER XXI

DISEASES OF NUTRITION

The writer retains the above classification for the diseases usually described under this heading—Rheumatism, Gout, Diabetes, Obesity, etc.—although certain forms of rheumatism undoubtedly have bacterial and parasitic concomitants. Auto-intoxication—intestinal and otherwise (carbonic acid retention)—are also unquestionably involved in the etiology of above diseases. Acute articular, acute and chronic bacterial and parasitic rheumatism (gonorrheal, diphtheritic, syphilitic) and arthritis deformans will be treated under the heading of Diseases of Muscles and Joints.

CHRONIC RHEUMATISM AND GOUT

The etiology of the rheumatic diathesis which latter may effect any section or organ of the body from the eyes and heart to the lower extremities, has not been absolutely determined. Hereditary predisposition, dietary errors, suboxidation (uric-acidemia) and carbonacidemia are all factors in the causation of symptoms broadly termed *rheumatism*.

The writer has closely tested the *Lahmann* carbonacidemia theory during the past three years and desires to be classed among the converts to this plausible and successful explanation of the etiology of many lesions, chief of which are rheumatism and gout.

Besides correct diet, personal hygiene, exercise, air baths, etc., hydrotherapy is employed in rheumatism for its eliminating and stimulating properties.

The subject is such a broad one that generalizations can only be given at this point, as each case must be carefully individual-

ized and treatment determined on the findings. As a general rule, warm and hot procedures, such as hot-air baths, local hot-air treatment, hot douches (steam), local hot fomenta, produce relaxation, elimination and sedation. General measures, such as hot full or half baths, and hot packs, also subserve the above purposes. These hot procedures, whichever is selected for the given case, must be carefully prescribed as to duration and repetition and *must always be followed by stimulating, tonic procedures*, such as cold ablutions, cold full or half baths of *short* duration, cold affusions or cold stimulating compresses or bandages.

The drinking of diluted fruit juices at *regular intervals* in large amounts, the capacity depending on the individual case, is a measure not to be omitted in rheumatism and gout. A fruit diet, as pointed out in a previous lecture, increases the alkalinity of the blood and furnishes the sodium ions for binding urates and other end-products of metabolism.

Cold baths or general cold measures are, as a rule, contraindicated in rheumatism and gout, excepting as tonic measures, when given for a very brief time *after* previous hot applications.

LITHEMIA. URICACIDEMIA. LITHURIA

Lithemia and uricacidemia cannot be properly classed as separate diseases. They have the same general etiology as gout and rheumatism and are frequently forerunners of these latter lesions. Patients with various and indefinite symptoms of disease, with scanty urine of high specific gravity, the sediment containing deposits of red sand or brick dust—which microscopically are found to be uric acid lozenges, rosettes, plates or concretions, are classified as lithemic or as suffering from uricacidemia. Oxalate of lime crystals are also frequently found in conjunction with above.

The hydrothermic measures outlined under rheumatism and gout apply here also; correct diet, the drinking of abundance of pure water or fruit juices with appropriate exercise in the open air being sufficient in many cases to secure improvement.

OXALURIA

Oxaluria is another of the terms for conditions of suboxidation—the diagnosis being made principally through the urine. The latter shows persistent deposits in large amounts of various forms of oxalate of lime crystals (envelopes, dumb-bells, concretions) with a consecutive high specific gravity. The oxalates may deposit owing to a persistent diet rich in oxalic acid (certain fruits and vegetables, as oranges, grapes, apples, rhubarb, asparagus and especially tomatoes); when these foods are eliminated for a while and the urine still persists in presenting the features of *oxaluria*, the diagnosis becomes certain. The general picture of oxaluria presents a patient who is losing in weight, suffers from melancholic symptoms—inability or lack of desire to work—various indefinite pains in the back, abdomen or thigh, with loss of appetite. These patients are usually of a sedentary type, and suboxidation and carbonic acid retention is invariably present. *Regular* exercise in the open air—daily, short *cold* baths or ablutions, the wearing during sleep of the cold, abdominal bandage, the drinking of sufficient cold water and general measures for toning up the muscular and nervous system must be employed. Diet must be carefully studied and regulated to meet the indications. Oxaluria cases do better in the mountains than at the seashore—dry, cold air being especially beneficial.

PHOSPHATURIA

Phosphaturia presents a general line of symptoms similar to oxaluria. The diagnosis is made only when the *simple* and *triple phosphates* are found in the urine *upon voiding* and *not* when found as secondary deposits after standing for many hours. In phosphaturia mental and physical weakness is more marked than in oxaluria and neurasthenic symptoms abound. Change of occupation and scene is essential—fresh air, moderate exercise only—the patient must vegetate and not be permitted to read or study to any extent. General tonic hydrothermic measures, especially the warm shower followed by the short vigorous fan-

douche given twice a day to be followed by moderate exercise, acts well. The cold, abdominal bandage should be worn during sleep, the parts being well abluted in the morning when the bandage is removed.

DIABETES MELLITUS

Diabetes mellitus has been variously classified as hepatogenous, gastro-enterogenous, pancreatic—and neurotic—the principal diagnostic symptom of *glycosuria* being present in all forms.

From the hydrotherapeutic view as regards treatment, diabetic cases are divided into such where, after strict noncarbohydrate diet the glucose disappears, and in such, where in spite of the diet, sugar persists. The latter must be particularly under strict supervision and had best take sanitarium treatment.

The principles of diet can be but quickly covered here, the more careful the selection of noncarbohydrate food, the better. The sour-milk diet has many advocates, the addition of the *bacillus bulgaricus* to good ordinary milk to form the *lactic acid milk* being preferred. Koumyss, kefir, zoolak, and other sour-milk preparations may be tried. The drinking of half a gallon of hot water between meals is also beneficial. The writer has recently prescribed *saccharomyces* in the form of ordinary yeast—*Fleishmann's* yeast—one-third of the cake with breakfast, one-third at lunch, one-third for the evening meal, with excellent success in several cases. One case with commencing gangrene of the toe responded to this treatment and combined local hot compresses.

General measures must be employed, such as warm shower baths, followed by short, cold ablutions or fan-douches, with subsequent exercise in the open air. In obese cases, passive exercise, *Zander* apparatus exercise and other measures to increase oxidation, must be prescribed.

If intestinal auto-intoxication is obviated and relieved by means of regular evacuations—the lactic acid milk diet and regular water drinking; the skin is kept active by warm or hot measures followed by stimulating cold tonic appliances, and the lungs receive an abundance of oxygen, acetonuria and coma are

prevented even in advanced cases. The abdominal cold bandage should be applied at night, and in some cases should be worn during the intervals of treatment at day also. In the latter class of cases care must be taken to have the bandage well covered and cold draughts must be avoided.

Recently the use of auto-condensation high-frequency currents have been lauded in diabetes (*Williams, Grook*). The writer has had occasion to test the effects of these currents in this disease and believes in their efficacy. He employs a condenser couch with one electrode over the epigastric region, and administers 400 m. a., for 20 minutes, three times weekly.

DIABETES INSIPIDUS

Diabetes Insipidus, which is conceded to be of nervous origin frequently with diabetes mellitus or syphilis as a hereditary feature, consists of an excessive flow of urine (polyuria) with associated nervous symptoms—irritability, loss of memory, etc. Hydrothermic measures have, in a few cases reported, been beneficial—in others results were unsatisfactory. The use of the Scotch douche over the dorso-lumbar spine, with subsequent active friction, has relieved the condition in one case. The use of *cold half baths*, with cold affusion to the dorso-lumbar region, is also reported as beneficial.

These cold, stimulating measures must be kept up for a number of weeks until the innervation controlling the renal vessels has been influenced favorably or restored. The use of galvanism between hydrothermic treatments, the electrodes placed over the sympathetic region affected, is also recommended.

OBESITY. POLYSARCIA

Obesity and polysarcia may be hereditary or acquired. The acquired form frequently follows prolonged dietary indiscretions; it also supervenes upon certain diseases, typhoid fever, diabetes, etc. Treatments for obesity are sometimes given *singly*, usually in combination, and include *dieting*, *exercise*, the drinking of *mineral waters* and hydrotherapy. Auto-induction

treatments, by means of high-frequency currents (cage-solenoid) are also recommended for their oxidizing properties.

In the majority of the obese, anemia is a constant factor, the lack of erythrocytes with consequent diminished oxyhemoglobin inducing suboxidation with supervening deposits of fat. Treatments directed to the condition of the blood, therefore, constitute important factors in the amelioration of obesity.

Dietetic measures must be calculated to permit the minimum of food consistent with health, the *Van Noorden* diet lists being probably the most generally accepted at present. The sour-milk diet has also many advocates. *Winternitz* recommends the drinking of large quantities of hot water between meals—no liquids with meals—as efficient in reducing obesity. He also advocates bi-daily half baths, 70°–75° F., for 10 minutes, with active massage.

The electric-light baths, hot-air baths, vapor baths, sun baths, are all factors which may be employed to produce copious diaphoresis and loss of weight. These measures must be given with due consideration of each individual case, repetition and duration depending on the reaction. The diaphoretic measures must always be followed by short, stimulating cold ablutions or showers. Hot packs may be employed in some cases, but the action of the heart must be watched in all instances. Passive and active exercise, massage and *Zander* apparatus will be employed as adjuvants in the treatment.

Hot-air baths, given for 30–50 minutes, followed by short, cold ablutions and massage, have many advocates in the treatment of obesity.

Moderately cold, full or half baths, 70°–75° F., given for 10–15 minutes, with active friction, increase oxidation and also cause improvement of anemic conditions, and are to be preferred in obesity to hot, full baths, which are debilitating, and when used to produce diaphoresis must be of short duration and invariably followed by cold tonic applications. Exercise should always be prescribed after cold applications to increase the reaction.

CHAPTER XXII

HYDROTHERMOTHERAPY IN VISCERAL DISEASES

This portion of the volume will treat of the application of hydrothermotherapy with reference to special organs. Some of the diseases treated under this heading such as pneumonia, tuberculosis and a variety of dermatoses should correctly be classified under bacterial toxemias, but for convenience of description will be classified under their respective affected organs.

DISEASES OF THE EYE

Correct knowledge of the action of hydrothermic measures in ophthalmic practice is of much benefit to the specialist as well as to the general practitioner.

Cold applied for a period of time over the conjunctiva lowers local temperature; heat increases same. The deeper structures of the eye are affected in the same way if the respective modalities of cold and heat are continued sufficiently long. Heat produces hyperemia, relaxation and analgesia and also causes absorption. Prolonged cold causes analgesia also, but is associated with anemia of the tissues. Ice, if applied for a prolonged period has been known to have caused artificial cataract. The methods employed for conveying hydrothermic measures are the eye bath—immersing the eye or eyes in a basin with the desired temperature of water, or using a special eye cup. Irrigations of the lid and eye—hot or cold; local compresses—hot, cold and ice—and dry or moist heat—by means of various radiant lamps or steam are also used.

Compresses are most frequently employed—they are cut about 3 inches square and made of 6 or 8 folds of fine gauze or soft linen. They should be applied over the lids and surrounding tissue.

When cold compresses are given for analgesic and inhibitive purposes they must be changed every half minute, the change being made very quickly (by having a number of compresses ready for each case) so as to prevent reaction. Where the stimulating action of cold is desired the compresses are renewed every 5-10 minutes. Ice compresses arranged and cooled on blocks of ice are particularly useful to reduce local temperature and cause inhibitive action on inflammatory processes.

In blepharitis, the cold compress, renewed every minute for one hour, acts well if applied daily. Irrigations with cold water are also beneficial.

Hordeolum and chalazion are absorbed by the application of dry heat—(lamps), carefully timed in each case. These small lesions are best rayed through an improvised small cornucopia, the small end of which is placed over the lesion.

In simple catarrhal conjunctivitis *cold* compresses changed every half minute for 15-30 minutes daily are advised. Follicular conjunctivitis requires the same treatment, but, instead of daily treatments, they should be repeated every 6 hours.

In purulent conjunctivitis (gonorrheal and septic) after the instillation of the favorite silver salt, ice compresses should be applied locally and changed every 30 seconds; this inhibitive action must, in some cases, be kept up for twelve or more hours, and as improvement is noted the time is reduced to 3-5 hours daily. Irrigations of normal salt solution are also recommended in this affection. As an adjuvant in the treatment of *trachoma*, cold compresses, applied regularly, act favorably.

In diphtheritic conjunctivitis, besides the local antiseptic solutions, *moist heat* favors relaxation and loosening of the membranes.

In phlyctenular conjunctivitis *heat* is also beneficial if combined with local antiseptic treatment.

In injuries to the conjunctiva and contusions, including the orbit ("*black eye*"), the use of suction to draw out the stagnant carbonic acid, with cold stimulating compresses renewed every 5-10 minutes, gives quick relief.

After the removal of foreign bodies, cold applied locally for 1-2 hours restores tonicity of the tissues.

Injuries from lime, acids—alkalies, with fibrinous exudations—must be irrigated with *cold water* and every foreign particle removed. Then follow with hot compresses to relieve pain and cause absorption.

DISEASES OF THE CORNEA

Von Graefe emphasizes the value of heat in corneal affections. Heat dilates the blood-vessels and increases local blood supply which, in corneal affections, is a desideratum, as the normal circulation is poor compared with other structures of the eye.

Heat is employed in the form of hot compresses applied for two hours at a time (may add suitable solutions if indicated), and repeated three times daily. Metabolism is increased and absorption favored and analgesia secured by heat. Interstitial keratitis, injuries to the cornea, ulcers, etc., react better to heat than to cold.

Diseases of the Sclera and Episclera

Heat acts favorably on the sclera and episclera on the same general principle as in corneal affections.

Diseases of the Iris and Ciliary Body

Heat relieves pain, relaxes muscles and causes dilatation of the pupil. Exudates are also absorbed through the influence of heat. In acute glaucoma heat relieves the pain very efficiently.

In diseases of the lens—cataract—absorption is favored by heat—dry heat is particularly valuable; dry radiant heat from various lamps being preferred.

DISEASES OF THE EAR

In otitis externa diffusa, heat applied locally relieves pain and promotes resolution. In otitis media catarrhalis acuta apply *dry heat* to the ear and affected side of the face or use irrigations of hot water with return-flow catheter.

In severe cases of pain—otalgia—*heat applied* on the affected site with ice compresses below the articulation of the jaw to

contract the large vessels of the neck at the same time, with the hot fomenta above, act well in combination in relieving pain.

In otitis media catarrhalis chronica *hot-air douches*, regulating the pressure and heat to each case, have been highly recommended. Chronic cases of deafness and tinnitus in some instances, have responded to the absorbing effect of the heat thus vigorously applied.

In otitis media suppurativa acuta et chronica irrigations with hot water by means of a return flow (solutions as indicated may be added) act as cleansing agents and produce local hyperemia which hurries resolution.

Acute mastoiditis is relieved by dry heat applied regularly and until pain ceases—if paracentesis has been performed the steam douche or heat applied regularly favors absorption and relieves recurrent pain.

Otalgia usually responds to heat—locally or by dropping heated liquids, drop by drop, into the meatus externus.

CHAPTER XXIII

DISEASES OF THE BRAIN

Many lesions referable in part to the brain and amenable to hydrotherapy, will be treated under different headings in the chapter on diseases of the nervous system.

Under above heading will be briefly discussed insomnia, cerebral paralysis, or apoplexy, anemia and hyperemia of the brain and meningitis.

INSOMNIA

Insomnia is a symptom accompanying many cases of constitutional disease, of infection, auto-intoxication and nervous reflexes. The causative factors must, if possible, be eliminated before therapeutic measures can be expected to give permanent relief. The ingestion of heavy meals at late hours, alcoholic over-indulgences, mental excitement, sexual excitement, burning of the midnight oil—overwork—must be avoided. The bedroom must be well ventilated—pure, cold air—the patient must be *warm* before retiring—in some cases the ingestion of a hot liquid, such as hot malted milk, warms the patient and reflexly relieves cerebral congestion. The patient must also be taught the value of auto-suggestion and be directed to *relax*—if necessary repeat the word *relax* many times until the body responds. A warm, full bath, 95°–98° F., for 20 minutes, with relaxation during the immersion, acts favorably in many cases. Cold ablutions must be shunned in such treatments, and the patient must wrap up warmly and get into a warmed bed so as to avoid *reaction*.

In cases of cerebral congestion or excitement the cold foot bath, with treading of water for 10 minutes, or the application of cold compresses about the feet, or the cold stocking—well wrapped with warm flannels—act revulsively and relieve the hyperemia.

The abdominal bandage—cold—applied on retiring, also acts well by relieving cerebral hyperemia, and is a favorite measure especially after dietetic excesses and late hours, banquets, etc. Insomnia due to anemia of the brain is relieved by stimulating cold compresses to the head and forehead, renewed when warm (every 2–3 hours), well covered by oiled silk and flannel.

When insomnia accompanies constitutional lesions, general hydrotherapeutic measures directed to the general condition will eventually be more successful than local treatment of any kind.

CEREBRAL PARALYSIS (CEREBRAL APOPLEXY)

The cause of cerebral apoplexy in all cases influences the prognosis of treatment. If due to embolus or thrombus, treatment is usually unavailing. If due to abscess, tumor or gummata, surgery and specific medication must be invoked. When due to hemorrhage, whether arterio-sclerotic or otherwise, much can be done for the patient if seen early. The patient should be placed in bed with head and shoulders slightly raised and resting on the *paralyzed side*.

A head coil should be arranged and cold water constantly kept circulating through same. In lieu of a head coil, ice compresses can be employed, renewed every 2–3 minutes. Ice bags, owing to difficulty in keeping them in place, are to be used only when other measures are not applicable. Simultaneously with the *cold head* treatment, the whole lower extremities should be treated to a dry, hot pack, with hot water bottles placed at the soles of the feet and the sides of the thigh. The lower extremities must be kept warmed so as to reflexly keep the cerebrum anemic and prevent spread of the hemorrhage. This treatment, if applied promptly in acute cases, must be continued for 24–36 hours and then the patient can be left to recuperate. To prevent recurrences physical and psychical strain must be avoided, the patient must sleep in a cool or cold room with good ventilation. Diet should consist of easily digested food with no excess of proteids; coffee, tea, spices and alcoholic beverages must be avoided. As the patient improves, half baths of 85°–95° F., for 5 minutes, given in the morning with *cold* compresses about the

head before, during and after immersion, act well in regulating the cerebral circulation.

ANEMIA OF THE BRAIN

This condition may be due to injuries, loss of blood (pulmonary, stomach, kidney, nose, etc.), also due to general anemia following chronic diseases or severe acute infectious diseases. Anemia of the brain may also be due to thrombosis, embolism or endarteritis.

In acute anemia of the brain the patient is placed in the *Trendelenburg* position and the face and head abluted with cold water in order to produce an increased blood supply to the brain. In chronic cases after hemorrhages, toxemias, fatty heart, etc., a modified *Trendelenburg* position can be given for 30 minutes twice a day with *stimulating* local cold compresses renewed every 2 or 3 hours, or when the compress becomes warm. In addition, mild stimulating general procedures, such as the warm shower, followed by a quick, cold shower or cold sectional ablutions, will tend to improve the general circulatory tone.

HYPEREMIA OF THE BRAIN

Hyperemia of the brain is noted in many cases of cardiac disease with the compensatory hypertrophy; it is also due reflexly to intestinal stasis, meteorism and chronic constipation. It also appears reflexly about the menopause or when menstruation is inhibited (colds, excitement) or in chronic hemorrhoidal states. Non-pathological hyperemia may be caused by overexercise, excitement, prolonged attention, overwork, straining at stool, etc.

Treatment depends on the etiology and the causative factor must be removed or ameliorated, if possible. The constant use of the cold abdominal bandage acts revulsively in many cases of hyperemia of the brain and the application should be renewed whenever the cloth becomes dry. Cold foot baths with treading of water, night and morning, for 10 minutes, also act well. The cold compress or cold coil over the precordial area acts favorably when the hyperemia is due to excessive cardiac action. The

cold, moist pack bi-weekly is also beneficial in regulating the general circulation and relieving cerebral hyperemia through an even redistribution of the blood stream.

CEREBRAL MENINGITIS

(BRAIN FEVER, CEREBRAL FEVER; ARACHNITIS)

Cerebral meningitis may be focal or diffuse. Hydrotherapy has been of benefit in acute leptomeningitis and the circulation of the pia mater and arachnoid can be favorably influenced through its agency. In pachymeningitis and tubercular meningitis the symptoms of the lesions can be influenced locally and reflexly through general hydrothermic procedures.

When the diagnosis of cerebral meningitis has been made, the patient should be placed in a cold room, with head slightly elevated and the head coil applied at once. Water at 60° F. must be kept circulating through the tube constantly, and if the coil is not used, cold compresses must be substituted, being changed every 3-5 minutes. Full baths, mornings and afternoons, at 103°-108° F., with cold compresses *to the head during the immersion* (15-20 minutes), have a tendency to relieve the overloaded pia and arachnoid by reflexly driving the circulation to the periphery. Elimination is also hastened by the hot bath and absorption increased. The hot bath also causes relaxation of muscles and relieves contractures and spasm. These baths must be kept up for many days before final results can be noted. The hydrothermicotherapy of epidemic cerebro-spinal meningitis has been treated in a previous chapter.

CHAPTER XXIV

DISEASES OF THE RESPIRATORY TRACT

CATARRHAL LARYNGITIS

Catarrhal laryngitis can be treated locally by means of the cold stimulating compress about the neck well covered with flannel and changed whenever it becomes dry and warm. Gargling of the throat with weak hot salt solution, a cupful every hour, also reflexly assists laryngeal resolution. To prevent recurrence, general hydrotherapeutic measures are requisite, the daily warm full bath followed by brisk cold ablutions or showers being preferred. The causal factors must perforce be minimized or prevented; thus the aphonia and laryngitis of public speakers, clergymen, politicians and teachers requires prophylaxis as much as treatment. Tobacco and alcoholic liquors must be forbidden, and speakers must study voice culture so as to properly utilize the muscles involved in the production of sound. Dust must be avoided and *rest* of the voice cultivated at frequent intervals. The use of the Russian bath twice a week during subacute laryngitis, followed by cold ablutions, acts favorably, and inhalations of steam or soothing medicated vapors (benzoin) palliate many cases.

EDEMATOUS LARYNGITIS (EDEMA GLOTTIDIS)

This disease requires prompt *surgical* treatment and is merely cited at this point because the persistent use of small pieces of *ice* swallowed and held far back in the mouth until dissolved has, in some cases, relieved the edema. The employment of hot compresses about the neck while applying the ice internally also tends to relieve the internal congestion and produces absorption.

SPASMODIC LARYNGITIS

(SPASMODIC CROUP; FALSE CROUP; CATARRHAL CROUP)

Hot compresses about the neck, renewed every 5 minutes for one hour, followed by the cold stimulating triangular bronchial compress renewed every 30 minutes, act very promptly in spasmodic croup. The spasm is also quickly relieved by immersing the child in a hot, full bath and giving an effective enema.

CROUP. CROUPOUS LARYNGITIS

(MEMBRANOUS CROUP)

This fatal affection requires correct diagnosis and prompt intervention by the physician. The indications for treatment require clearing the parts of the false membrane, preventing spasms of the glottis and keeping up the resisting power of the child.

Moist heat, applied by means of the vapors of the "Croup Kettle," tends to produce local leucocytosis and hyperemia and loosens the membrane.

Hot fomentations applied over the larynx and trachea and changed five times hourly, to be followed by the cold, stimulating compress, will act beneficially. Warm baths, with cold affusions applied every 5 minutes to the nape of the neck until a vigorous respiratory reaction with cough is induced, have also produced expectoration of the membrane.

LARYNGISMUS STRIDULUS

(SPASM OF THE GLOTTIS; PSEUDO CROUP)

Heat is indicated as an adjuvant in this affection. Steam inhalations produce relaxation and hot fomentations applied to the throat also relieve the spasm. The fomentations should be renewed every 10 minutes, and after relief is obtained should be followed by the cold triangular throat compress for local stimulating purposes.

TUBERCULAR LARYNGITIS

General measures as advised under pulmonary tuberculosis must be applied in this lesion. Local hyperemia or fluxion, applied for purposes of phagocytosis and resolution, must be added to the general treatment. Hot compresses applied firmly over the larynx and trachea, renewed every 10 minutes for one hour, to be followed by the cold stimulating compress for 30 minutes, this treatment being given six times daily, has relieved the irritant cough, loosened the expectoration, and if persisted in promises relief in some cases. The *Kuhn* suction mask which produces local hyperemia, also promises well in this intractable disease. Preliminary reports warrant a trial of the measure in all cases.

WHOOPING COUGH. PERTUSSIS

Change of air and climate have often proven specific for this infection. Pure air is essential for the diminution of the attacks and general systemic treatment—warm baths followed by a stimulating cold shower are requisite. The cold, stimulating triangular throat compress should be worn at night when in bed, and the author particularly recommends the cold abdominal bandage as a boon in this affection. The cold abdominal bandage should be *firmly applied so as to somewhat compress the diaphragm* and should preferably be applied at night simultaneously with the throat compress. The drinking of hot water, or preferably hot lemonade, during the day is also beneficial in relieving spasm and preventing the cough.

One goblet of hot water or lemonade is to be given hourly until the paroxysms are markedly diminished, when the hot liquid can be given less frequently, every 2 or 3 hours.

ACUTE CATARRHAL BRONCHITIS

The cold triangular bandage is useful in acute bronchitis. Same must be renewed every 30–40 minutes, or when dry, and applied constantly until cough and temperature have abated.

The breathing of hot, moist air (Russian bath), vapor, and steam also acts favorably in loosening the catarrhal discharge. The air in the sleeping or living room where the patient remains can be charged with humidity by means of steaming water placed in pans in all quarters of the room, which are frequently refilled and which tend to absorb the dust, and through the relaxing effect of the heat relieve spasm and facilitate expectoration.

CHRONIC CATARRHAL BRONCHITIS

(WINTER COUGH—BRONCHITIS OF THE AGED)

This affection can be favorably influenced by climate; in many cases a change to a warm, dry, equable climate prevents recurrence and obviates an attack. Prophylaxis must be advised. Well aired and dust-free rooms, abstinence from tobacco and alcoholic beverages, attention to the general health—activity of the skin particularly must be observed. The patient should wear linen-mesh underwear and beware of undue exposure to extremes of temperature. If due to rheumatic or gouty diathesis or gastric lesions, the underlying cause must be ameliorated. General tonic treatments, such as warm full baths, followed by the stimulating cold shower or ablution applied daily, or in some cases twice a day, are beneficial.

To ease expectoration during an attack, the application of hot fomentations over the bronchial area every 10–15 minutes act favorably. During the night the cold, stimulating triangular compress should be worn about the throat and upper bronchial area and the parts abluted in the morning. Hot lemonade and hot water, taken in large quantities, also tend to check the cough and relieve the bronchorrhea.

ASTHMA

(BRONCHIAL ASTHMA; SPASMODIC ASTHMA)

In all cases of asthma a careful examination for reflex causes must be instituted. The nasal mucous membrane must be placed in normal condition, chronic bronchitis relieved, gastropnoia and dilatation of the stomach, diaphragmatic abnormali-

ties and cardiac, spinal, renal, rectal, sexual and other reflexes treated. The gouty diathesis, which often produces asthmatic paroxysms, must be treated as the basic cause when found and general treatment instituted. A large percentage of asthmatics examined by *Roentgen* rays were found to be suffering from aneurisms of the aorta which, directly or reflexly, caused the asthmatic attacks.

Change of location or climate will act favorably in some cases, a return to the old quarters again bringing on the old attacks.

In true bronchial asthma the following general hydrotherapeutic measures will be found of value:

Nocturnal prolonged warm full baths at the indifferent zone or slightly higher (98° F.), with relaxation of the patient while in the bath. The duration of the bath should vary according to the strength and age of the patient—from 15–30 minutes. This bath should be followed by the application of the hot, abdominal bandage, which is applied same as the cold and which is covered liberally with warm, thick flannel cloths. This hot abdominal bandage produces relaxation of the diaphragm and reflexly of the bronchioles. In the morning the parts should be abluted with cold water, or a short, cold, stimulating shower taken for its tonic effect.

In asthma of nervous etiology revulsive treatments palliate the attacks; thus ice compresses to the occiput or hot foot baths or hot hand baths relieve promptly. Hot fomentations over the bronchial area also relieve the spasms of the bronchioles, and should invariably be followed by brisk, cold ablutions to restore tonicity of the parts.

Hot enemata repeated every half hour also reflexly relieve the spasm and in cases of intestinal or renal complications are to be preferred to other measures.

When possible, a half bath at 80°–85° F., with cold affusions to the cervical and dorsal spine, should be indulged in during the day for its tonic effect on the respiratory tract. The bath should consume 10 minutes, and the cold affusions should be given three times during the immersion; during the rest of the time the patient should be gently rubbed and should personally assist in this massage by rubbing his own chest and arms.

Russian baths are found palliative by some patients, and sweating processes such as the hot-air cabinet relieve spasm and produce relaxation, besides excreting toxins through the sweat glands. All these hot procedures must be followed by short, cold stimulating applications.

The use of radiant heat by means of powerful lamps, 300–500 candle power, has recently been reported curative in cases of asthma. The bronchial area was rayed for 10–15 minutes daily, and the relief was noted after one week's treatment.

Röntgen rays have also been successfully tried for the relief of asthma, the exact *modus operandi* of the therapeutic action remaining still to be explained.

HAY FEVER

(HAY ASTHMA; AUTUMNAL CATARRH; ROSE FEVER)

Hay fever has many points in common with bronchial asthma and, as in the latter disease, all reflexes must be carefully investigated and ameliorated, if possible. The gouty and rheumatic diathesis must be corrected and carbonacidemia combated. An attack of hay fever is often obviated by change of climate during the period of its severity—July to October—especially if the locality is dustless and pollen-free. Sea voyages are particularly beneficial, and a stay at the seashore during the period of aggravation prevents distress. Where these prophylactic measures cannot be enjoyed the patience of the hay-fever sufferer is tested with various measures adopted by physicians for the amelioration of this intractable disease.

The writer advocates the wearing of the cold, abdominal bandage during the day, care being taken to have it well covered by flannel, and the cloth being changed about every 3 hours. On retiring, the cold, wet stocking is applied, and this reflexly relieves the engorged turbinates better than any measure we know of. We have also advocated the wearing of a mask composed of two pieces of fine wire mesh aluminum between which is placed a layer of absorbent cotton, the mask fitting snugly over the nose and mouth. The air inhaled is thus filtered and

irritations of the *Schneiderian* membrane minimized. The cotton between the wire mesh may be changed twice a day, or oftener if desired, and the mask may be sterilized daily. The mask should be worn constantly, day and night, during the period of aggravation, excepting during sleep, when several layers of fine cotton gauze may be substituted for the mask.

PLEURITIS

(PLEURISY)

Pleuritis—dry and moist—with effusion, is favorably influenced by hydrothermic procedures. When empyema supervenes surgery must be promptly invoked.

At the beginning of pleuritis, before effusion has become established, the application of the cold, stimulating thoracic compresses, or cross-binder bandages, changed every 30 minutes, is advised. These compresses or bandages should be *firmly* fastened so as to somewhat restrict thoracic breathing. In addition, the daily, cold, moist pack is administered, the patient remaining in the pack until the cloth is dry and warm—usually one hour. An abundance of drinking water must be given, and a cold ablution follows the pack. This routine (with remedies as indicated) has been found effective in acute pleuritis. When effusion has taken place, the application of heat is indicated. Hot bran bags, hot poultices (clay, antiphlogistine, fango) applied continually over a somewhat larger area than the parts affected, relieve pain, produce absorption and induce local hyperemia with coincident leuco and phagocytosis. Hot fomentations are also valuable, the cloths being changed every 15 minutes. Hot air apparatus can also be used for the local application of heat, as well as electric lamps or thermophores.

In pleuritis with effusion, the cold, moist pack given once a day, as described under acute pleuritis, should be continued. Its general tonic and eliminative properties renders valuable aid in securing resolution of tissue. When the pack is strongly objected to or not well tolerated, the half bath at 80°–85° F., with mild friction for 10–15 minutes, may be substituted. In

chronic pleuritis, daily half baths, as indicated above, with the continuous application of some form of heat, is applied. Nocturnal prolonged warm baths, 95°-98° F., 30 minutes, also assist in elimination and in the absorption of adhesive deposits.

In chronic pleuritis of tubercular etiology, general tonic applications with the application of some form of hot poultice to induce intermittent local hyperemia and relieve pain, must be persistently carried out.

CROUPOUS PNEUMONIA

(PNEUMONITIS; LOBAR PNEUMONIA; PLEURO-PNEUMONIA)

Croupous pneumonia must properly be classified under bacterial and autotoxemias, but for convenience of reference it is treated under the heading of respiratory diseases. Like typhoid fever, pneumonia is not a local disease but a general systemic affection with its chief apparent pathological lesion in the lung. It requires, therefore, general systemic treatment with especial reference to the emunctories and the circulation, the toxins expending their chief virulence upon the heart, which must in all cases receive our utmost care.

With the appalling high mortality given by vital statistics in pneumonia, it is astonishing that hydrotherapy has not been thoroughly and generally tested in this disease, as pneumonia presents no great difficulties in treatment to the carefully trained hydrotherapist. The author has before him a report of ninety-two consecutive cases of croupous, catarrhal and influenza pneumonia* treated with simple hydiatric measures with a mortality of three; of the latter, two were also suffering from pulmonary tuberculosis at the same time, the bacillus being found in the sputum. Excluding these complicated cases, the claim can be made that ninety cases of pneumonia treated hydiatrically showed a mortality of one. *Doctor Nespor's* technic consisted of cold ablutions and local applications of cold bandages or compresses. The ablution was performed in sec-

* *Doctor Gustav Nespor, Blaetter fuer Klinische Hydro-Therapie, January, 1903.*

tions, friction being employed over the moistened parts. The parts to be treated were exposed, wrapped in a well saturated—cold—linen cloth and gently rubbed until the respective part becomes warm. The cloth is then removed and the part rubbed until thoroughly dry and then covered with warm blankets. The next section is then gone over in the same way, and the body is thus abluted until the whole surface has been covered. These sectional ablutions are performed three or four times at one seance, two or three seances being administered daily, depending on the general condition. *Nespor* claims that these ablutions, if performed as described, correspond in their action to a bath of 75° F., of eight minutes' duration. The procedure is well borne by the patient, who in many cases requests a repetition of the treatment, as it improves his condition. In the interval between ablutions cold compresses are applied over the thorax, and these are renewed when *warm and dry*—about every 30 minutes. If the pulse shows signs of weakness the *Winter-nitz* coil or a cold compress is applied over the cardiac area, the cold compress being changed every 30 minutes.

Pneumonia patients should be well covered and placed in a sunny, well-ventilated room in an even temperature, 50°–60° F., the bed being supplied with a back rest so that the position of the thorax can be changed readily without any effort on the part of the patient.

The cross-binder or bandage carefully applied, rinsed in cold water, 50° F., is a favorite hydiatric measure and should be renewed whenever the bandage becomes warm. An extra cold compress may be interposed at the precordial area whenever the myocardium requires stimulation. This cold compress should be changed in such cases every 20–30 minutes, depending on the reaction. Twice a day, cold retention enemata are applied to keep up the fluidity of the blood, reflexly stimulate the vasomotor nerves and secure increase of emunctorial function. The lowering of the temperature is coincident with these acquisitions.

Fluid diet—milk, lactic acid milk, fruit juices, broths—should constitute the diet. Alcohol is in our judgment detrimental; if stimulation of the circulatory apparatus is required the carefully timed cold compress over the heart will serve all purposes

if combined with the general stimulating measures (cold ablutions, cold compress, cold half baths).

In hospitals and when the bath tub is readily accessible, the cool half bath, 80°–85° F., given twice a day for 10 minutes with cold affusions to the back of the neck and dorsal spine, act favorably in all cases. The affusions should be given at intervals of five minutes (twice during the immersion), one gallon of cold water, 50°–60° F., being poured over the spine from a distance of two feet; gentle friction is indulged in during the entire immersion.

The excellent results obtained from sectional ablutions and cross-binder applications permit omission of the baths and the individual judgment of the physician must determine whether the patient requires the bath in addition to the other measures for his amelioration. Special attention must be paid to the mouth and gums; the patient should gently gargle or rinse out the mouth with hot, normal salt solution frequently during the day, and fruit juices or cold water should be imbibed liberally during the day, fully two quarts of water being the average supply.

When expectoration becomes difficult, the application of hot fomentos or hot poultices (clay, antiphlogistine, mustard and flour mixed), will produce relaxation and favor the discharge of the excretion. These hot applications should be renewed whenever they become cooled, and when they are removed a quick, cold ablution over the parts is given to restore the tonicity of the tissues treated.

CATARRHAL PNEUMONIA

(BRONCHO-PNEUMONIA; LOBULAR PNEUMONIA)

Catarrhal or lobular pneumonia presents the same points for treatment from the hydiatric standpoint as croupous pneumonia. It is advantageous, in addition, to have the air of the room in which the patient rests well saturated with moisture—hot saline solutions being preferred. The patient should be changed in position frequently, the application of the cross-binder carry-

ing this injunction with it as a matter of technic. Underneath the cross-binder the author has usually placed the cold, triangular bronchial compress as an additional stimulation, same being changed whenever the cloth becomes warm and dry.

The *cool* half bath with cold affusions to the cervical spine, as described under croupous pneumonia, has served well in catarrhal pneumonia. In children and the aged it is necessary to give the half bath at higher temperatures, 95°–100° F., but the cold affusions must remain the same; the latter have a markedly stimulating effect on the respiratory function.

The inhalations of steam—croup-kettle—are grateful when bronchial irritation is marked, and hot fomenta also serve as a respiratory sedative. The patient should drink water liberally and may gargle frequently with a mixture of one part glycerine to four parts of hot water. The latter acts reflexly as a sedative to the cough-habit.

PULMONARY TUBERCULOSIS

(PHTHISIS PULMONALIS; PHTHISIS; TUBERCULAR PHTHISIS; CONSUMPTION; PNEUMONIC PHTHISIS)

Much has been written on the climatic, dietetic and hydrothermic treatment of tuberculosis of the lung. The scope of this work compels but a brief recital of the adjuvant value of the measures classified under hydrothermotherapy concerning which there is, or can be, no dispute. The remarkable success of *Professor Bier* in the treatment of tubercular joints with hyperemia, and his suggestion that tubercular lesions everywhere should respond to the same principles, deserve to be fully tested. *Doctor Bier* emphasizes the statement of *Rokitansky*, that whenever cardiac lesions produce pulmonary stasis, tuberculosis has never occurred. *Frerichs*,* in 1853, made the statement that diseases of the pulmonary artery have as a sequel tuberculosis of the lung—same being an accompaniment of the induced anemia of the pulmonary tissues.

Frerichs' and *Rokitansky*'s statements all point to hyperemia as a therapeutic agent or prophylactic for tuberculosis, and the

* *Uebersicht über die Ergebnisse der Med. Klinik zu Breslau. Wiener Med. Wochenschrift*, 1853, No. 53.

open air and climatic treatment of tuberculosis abundantly verify it.

Dr. A. C. Geyser, New York, is, at this writing, experimenting with artificially induced passive hyperemia of the lung as a therapeutic measure in tuberculosis, and his preliminary results in a number of supposedly incurable cases certainly confirm the hopes entertained in hyperemia as a method of cure in all tubercular lesions. Doctor Geyser's technic consists in employing the *Esmarch* bandage on the lower and upper extremities of his patients for 3 hours, twice a day, interspersing stimulating hydropathic measures, and raising the foot of the bed eighteen inches and inhaling iodic vapors. All these measures are calculated to induce pulmonary fluxion and hyperemia and favor resolution of tissue. The writer has elaborated the technic in the cases treated by him as follows:

In the morning on awakening, a hot sponge, followed by a quick cold sponge; careful hygiene of the mouth, tongue, teeth and gums; light breakfast—fruit and cereals—and one hour later bandaging of the extremities with the rubber *Esmarch*. The pressure of the *Esmarchs* must be carefully regulated, and it is best to start with *one limb* only on the first day of bandaging and note the effect upon the expectoration. If the sputum shows evidences of blood, it indicates that fluxion has been secured and only *one limb* must be compressed at this time, and pressure *diminished* in that one. If *no signs* of hemorrhage appear, the rest of the extremities can be *Esmarched*, adding one extremity daily until *all four* are compressed. By raising the arms over the head and raising the foot of the bed gradually until 18–20 inches is attained, fluxion to the lung is much augmented and local pulmonary hyperemia attained. This compression renders the extremities anemic for the time being, and when the bandages are removed after *three* hours, the parts must be rubbed with cold, moist cloths to restore local tonicity of tissues. Two hours after the noon meal an active hot sectional ablution or sponging is applied, followed by a short, cold ablution, and half an hour later the *Esmarch* bandages are reapplied. The afternoon bandages remain in position for 3 hours also, and when removed the parts are again ablated with cold water.

The foot of the bed remains high *constantly*, unless the patient finds difficulty in sleeping in this position, in which case allowances must be made, and a comfortable position selected.

All recognized measures of value in treatment—pure, fresh air—diet, especially fruits and vegetables, are added to above treatments and auto-intoxicants (excessive feeding) prohibited.

The alternate hot and cold ablutions tend to stimulate the function of the skin and carbondioxid excretion, which is lagging in all pulmonary diseases, is diverted through the increased emunctorial activity of the skin, and carbonacidemia is thus combated successfully. With the skin thus stimulated, night sweats diminish or are absent, and if careful nutrition is observed with the technic described, favorable response may be expected even in somewhat advanced cases.

The *Kuhn* suction mask for the hyperemic treatment of pulmonary tuberculosis* is based on the principle of inducing local passive hyperemia by obstruction to the respiratory act, the obstruction being regulated in each case and gradual time limits for the use of the mask established.

Winternitz (*Zur Pathologie und Therapie der Lungenphthise*, 1887) pointed out the path which *Bier's* subsequent researches have cleared of obstacles. He showed that *general systemic treatment* was requisite for good results in pulmonary tuberculosis; that simple change of climate alone did not suffice, but that *toxemia* must be combated, the *anemic pulmonary* circulation stimulated and all functions brought to normal conditions before *restitutio ad integrum* could be vouchsafed.

Mild but stimulating cold procedures are advocated as hydrotherapeutic adjuvants in this disease. The cold procedures must be individualized in each case, so as to secure the reaction or fluxion required for healthy stimulation of the circulation and the peripheral and central nervous system. The skin must be made to functionate well and excrete the CO_2 , which the lung is deficient in doing, and be so treated that changes of temperature can be well borne.

Tuberculosis being almost invariably associated with an anemia of the skin, the function of the latter is usually inhibited

* Described by Dr. W. Meyer, *Medical Record*, November 9, 1907.

—its CO_2 excretion is diminished and the necessity for hydrothermic processes to improve this deficiency and to stimulate the skin so as to assist the lagging pulmonary excretion should be apparent to all observing physicians. Well-regulated cold procedures are known to favorably influence the heart, its increased tonicity furnishing a greater volume of blood to the pulmonary blood-vessels and inducing local hyperemia.

Sectional cold ablutions applied as described in the chapter on pneumonia are powerful tonics in tuberculosis also. They stimulate the skin function and increase its elimination of toxins. When night sweats are present, hot sectional ablutions are given twice all over the body, followed by a tonic cold sectional ablu-tion; all being performed at one treatment, and repeated twice or three times daily, depending on the case. These sectional ablutions obviate the shock of cold baths and the danger of hemoptysis is minimized through their use.

The cold sectional ablu-tion must be properly performed and friction over the parts indulged in until the skin becomes red and fluxion has been established. Between the sectional ablutions the thoracic cold cross-bandage or binder may be applied. This procedure is preceded by a general warming up by means of a short electric light bath or hot fomenta applied over the thorax for ten minutes. The effect of applying the cold thoracic bandage immediately after these hot procedures is very profound. The whole thoracic blood supply is vigorously stimulated, and the heart itself promptly responds to the tonic stimulation.

At night, when cough is distressing, hot fomenta to produce relaxation are applied over the bronchial area, and hot water is imbibed slowly for the same purpose. The author favors adding a small quantity of glycerine to the hot water.

The nocturnal application of the cold, abdominal bandage has excellent results on the alimentary function, especially if super-alimentation has produced gastric distress. The parts must be thoroughly ablu-ted in the morning with cold water, after removal of the bandage. The imbibition of abundant fluid during the day is desirable—lactic acid milk being a favorite beverage.

When chills occur, the drinking of hot water and the application of hot water bottles to the thighs act well.

Pulmonary hemorrhage is combated by applying ice compresses to the chest, especially about the clavicles, and hot fomentations to the upper dorsal region between the shoulders. The latter must be renewed every 5 minutes to be effective.

Tubercular abscesses or empyema, when surgery is not indicated, are treated with very hot fomentations. The hot cloths are firmly applied over the affected area and changed every 10 minutes for 2 hours daily. After this treatment the parts are abluted with cold water to restore tonicity.

When sectional ablutions cannot be indulged in it is well to instruct the patient as to home treatments in hydrotherapy.

Morning and evening the chest should be abluted with much friction, using cold water to increase local tonicity and produce hyperemia.

A daily prolonged warm bath, 95°–98° F., 30 minutes, acts favorably, and if very mild cold affusions to the nape of the neck and dorsal spine can be administered while in the bath, respiration will be improved.

The patient should drink from two to three quarts of water or acidulated water (fruit juices) daily. The imbibition should take place *between meals*. The abdominal bandage, as mentioned before, should be worn at night and the parts abluted in the morning.

These various applications must all be made with due regard to the condition of the patient—it being well to remember that tubercular cases require rest and no excitement, and active measures must be short in duration and be followed by rest after each treatment.

Sea bathing, cold, full baths, cold douches and *all extremes of temperature* are contraindicated in tuberculosis of the lung. Thus prolonged Turkish and Russian baths have frequently induced hemoptysis and collapse.

CHAPTER XXV

DISEASES OF THE HEART

Although *Wilhelm Winternitz* had advocated the employment of hydrotherapeutic measures in pericardial and cardiac lesions for many years, it remained for the convincing demonstrations of the Nauheim bath treatment in recent years to convert the medical profession to the use of this therapeutic agency in suitable cases of heart disease.

In the physiological chapters of this volume the action of hot and cold procedures on the blood-vessels and heart were explained. The favorable action of the cold compress and the heart coil as a tonic to the myocardium, with slowing of the pulse, and improvement in contraction of the heart muscle was dilated upon. The action of short, cold, general applications to the skin, with subsequent reaction and its marked stimulating action on the respiration and the myocardium was also fully explained. The Nauheim bath treatment is based on similar principles, which will be more fully explained when describing the technic of these baths.

ACUTE PERICARDITIS

Absolute physical and psychic rest is most essential in this lesion. The patient should be placed in bed in a horizontal position in a well-ventilated room, and the heart coil applied over the precordial area, permitting water at 65° F. to flow continually for two hours, with two hours' rest—this technic being repeated during the day and, if necessary (precordial distress, palpitation, pain) during the night also. As the symptoms improve cold sectional ablutions of the anterior surface of the body with mild, gentle friction, will prove beneficial.

The patient must not be moved and the urine and feces evacuation by catheter and enemata, if necessary. Milk and fruit diet is advantageous, and water should be given in *small quantities only*, at frequent intervals, however.

When the heart coil cannot be secured, the ice compress changed every 15 minutes, with gentle friction over the precordial area at each change to prevent local tissue necrosis, will be employed. When the heart coil is not in use the cold, stimulating compress will be applied. When effusion has taken place, the dry, hot pack with the heart coil in place should be employed once a day to produce absorption. After the pack a quick, cold ablution will be given.

ACUTE ENDOCARDITIS

As in acute pericarditis, acute endocarditis or valvulitis, requires absolute physical and psychic rest. The heart coil is applied for two hours, with two hours' intermission, as in pericarditis—employing water at 60°–65° F.; cold compresses renewed every 15 minutes may be substituted. Sectional ablutions with cold water and moderate friction will be employed three times daily. Diet must be carefully regulated, milk, fruit and vegetables being preferred. Mild passive exercise is started when the acute condition has subsided.

MYOCARDITIS

The diagnosis of myocarditis being difficult, a tentative diagnosis should demand treatment along the lines of pericarditis—ice, however, should not be employed; the cold stimulating compress renewed every 15 minutes, or preferably the heart coil with technic as outlined under pericarditis, should be utilized until the symptoms have abated.

The etiology must be carefully sought and its factors removed—syphilis, rheumatism, gonorrhea, septicemia, alcoholism, nicotine, trauma—inflammatory conditions of adjacent organs or tissues. Chronic myocarditis requires constant supervision of the physician with regulation of habits and diet to meet the requirements of the case.

FATTY HEART

Two distinct pathological processes are comprised under above term.

Fatty infiltration and fatty degeneration present different etiological and pathological processes and must be treated symptomatically and on general principles.

Fatty degeneration of the heart follows some chronic inflammatory process, arterio-sclerosis—thrombus or embolism—fatty infiltration being the accompaniment of a general adipose condition.

Tachycardia and stenocardia are relieved by cold compresses to the nape of the neck or over the precordial area applied for 15 minutes only and repeated hourly when required. Cold sectional ablutions also act favorably on the heart and relieve cardiac distress—friction in these cases must be active and vigorous to induce peripheral reaction.

In obesity with fatty infiltration, the general measures advised under that disease will be observed.

HYPERTROPHY OF THE HEART

Hypertrophy of the heart demands abstinence from alcoholic beverages and indigestible foods and spices. Mental and physical overexertion must also be avoided.

Moderate exercise is beneficial and must be individualized for each instance.

Cold sectional ablutions given in the morning and late in the afternoon are excellent, and the cold abdominal bandage should be applied at night on retiring.

Abundant rest during the day is advised and the application of ice compresses over the precordial area for half an hour during the afternoon rest has been found of value, and its reflex action on the heart muscle distinctly beneficial.

CARDIAC NEUROSES

Cardiac neuroses are of very common occurrence, the etiology in each case being sometimes difficult to discover. The attacks

must be treated symptomatically, therefore, and if the causal factor is discovered appropriate treatment subsequently applied.

Palpitation of the heart and tachycardia are promptly palliated by means of the ice compress or coil applied to the nape of the neck. Persistent use of the heart coil with nocturnal application of the cold abdominal bandage often permanently relieves these conditions. Cold foot baths with treading of water, 50°–60° F., for 5 minutes, also act favorably.

Bradycardia, whether inherited or acquired, is improved by means of active reactive measures. These include heating procedures (electric light bath, dry, hot pack, hot shower) followed immediately by *cold* procedures of short duration. A hot shower or douche followed by a cold shower of 10 seconds' duration acts as a markedly stimulating and revulsive measure. Exercise selected for each case with favorable cardiac response as a sequel is also indispensable in these cases.

In angina pectoris (neuralgia of the heart; stenocardia) causal factors must be eliminated if determined. Hydrotherapy can be employed in addition to well-known medical palliatives for the relief of this condition. Hot fomentations over the precordial area applied for one minute followed by cold compresses applied for five minutes—this alternation kept up for several hours, if necessary, frequently palliates an acute attack.

Hot hand baths and hot foot baths also palliate angina pectoris almost instantly. They are to be taken with water at 120°–130° F., and either the hands or feet are to be immersed for 15 seconds. This is repeated several times every 5 minutes until improvement is noted.

NAUHEIM BATHS

(CARBONIC ACID AND SALINE BATHS)

The late *Dr. Anton Schott* and his brother, *Dr. Theodore Schott*, were instrumental to a large degree in popularizing the so-called combined saline and carbonic acid bath—now generally called the Nauheim bath treatment. This treatment consists of specially graduated baths combined with passive exercises, and

results have been so satisfactory in a large percentage of cases that medical acceptance of the treatment was compelled in all quarters of the world.

The London *Lancet* (1896, pages 619-621) sent a commission to the Nauheim baths which reported as follows: "Nauheim is most fortunate in its possession of richly saline and gaseous waters; that these have a marked influence for good or for evil (according to skill in their use) upon the vascular system. In a carefully regulated and supervised '*Widerstandsgymnastik*,' or resisted movements, there is likewise a powerful means of influencing the heart's action, but that, as in the case of other powerful agents, the physician must be content to observe their effects slowly develop and not by rapid and extraordinary shrinkage in the cardiac area, which can only be attained as a rule, if attained at all, by imposing a strain upon the patients, which it is well to avoid. If these conclusions be correct, it is, moreover, desirable, in the interest of the public, the profession, and of science, that a system about which there is absolutely no more mystery than there is in the skilful use of any remedial means whatsoever, and which, with instruction and observation, should be quite as capable of utilization by any practitioner as digitalis or any other cardiac agent, should receive consideration from those in this country whose education, opportunities and status entitle them to speak with authority."

The late *Dr. William Tod Helmuth*, who was treated at Nauheim, in 1899, and received much improvement therefrom, described the action of the baths as follows:

"The saline carbonic acid baths act as mild irritants over the entire surface of the body. The afferent branches of the inhibitory peripheral nerves distributed to the radicals of both arteries and veins, carry the sensation to the vaso-motor centers (which also influence the cardiac centers) with resulting mild contraction of the vessels. The efferent branches of the inhibitory nerves coming down from the vaso-motor centers thereupon produce secondary dilatation of all the vessels; first the peripheral, second the internal.

More blood flows to the surface, a sensation of warmth is experienced, the heart, previously overburdened, has a part of

its strain removed, the force to overcome being so materially diminished that the central organ, obeying the law for which muscular fiber is created, *contracts itself to rest*, thus diminishing its size. After the treatments better nutrition with increased metabolism sets in."

The writer, who visited Nauheim in 1905, found on investigation that the treatments were strictly individualized, the physicians prescribing the number, character and duration of baths and exercise in each case with due regard to reaction and results, as is customary in all hydrothermic applications.

The cases in which a slight routine is followed and for which the Nauheim treatment is particularly efficacious are:

1. Cases of cardiac dilatation due to physical and mental overwork or strain.
2. Mitral lesions where the right ventricle shows signs of weakening and where compensation commences to lag.
3. Fatty infiltration of the myocardium.
4. Adherent pericardium with associated embarrassment to cardiac action.

Contraindications are all advanced cases of arterio-sclerosis, advanced myocarditis, fatty degeneration of the heart, aortic insufficiency, aneurism of the aorta, angina pectoris and cases of marked debility.

The patient going to Nauheim should before arrival have made his hotel or boarding-house arrangements and selected his physician—ascertaining the duration of his stay and making his arrangements accordingly.

The plan followed, where slight routine is indicated, is as follows: The first bath—warm saline—is usually taken from Spring Number 7, which contains 2% Na. Cl., a small percentage of calcium chloride and a small amount of carbonic acid. The temperature is arranged at the indifferent zone, 92°–95° F., and the patient remains in the full bath for 8–10 minutes.

The temperature is lowered one degree daily, and the time gradually increased to fully 20 minutes, depending on reaction. When the temperature has been gradually reduced to 80° F. there is no further reduction, but the rest of the baths are taken at this point. The patient is examined daily and the saline con-

stituents of the baths changed—making the salt and mother lye stronger gradually to secure more intense dermal reaction.

The patient receives a holiday once a week, usually after each third bath, when he is expected to *rest* in bed, in most cases, or if in good condition, follow his own volition.

After a few weeks of the milder baths, the strong, flowing Sprudel baths are given with marked increase in the carbonic acid and the stimulating effect of the running water which keeps flowing through the tub, by means of an overflow pipe. These are given for a week or more, depending on results, the time and temperature being carefully selected.

The usual course of baths consumes four or five weeks—25 baths being administered—and this “cure” may be supplemented by a short course of 12 baths more if the patient requires it.

After each bath the patient is well rubbed and rests fully one hour in a recumbent position. The *Lingg* or passive, or resistive movements prescribed for each case are then indulged in, and the patient is subsequently usually visited by his physician or goes to the “Sprechstunde” for his consultation.

The following precautions are observed:

1. The patient should be prepared as in all full baths.
2. Baths are given in the morning (10–11 A. M. preferred) on an empty stomach.
3. The patient must remain passive and relaxed during the bath—he must not exert himself at any time.
4. The patient must be immersed to the neck, and if necessary have a head rest or be supported while in the bath.
5. Patients who are susceptible to the carbonic acid fumes should have a covering over the bath tub and merely protrude the head from it.
6. The patient should be accompanied by an attendant who watches the pulse and reaction of the skin.
7. A warm drink may be imbibed during immersion or immediately after same.
8. Friction is dispensed with as the carbonic acid gas keeps up the dermal irritation, and the periphery keeps well suffused with blood through this action.

ARTIFICIAL NAUHEIM BATHS

The artificial Nauheim bath may be administered at the home, in hospitals or in sanatoria, by employing artificial saline carbonic acid baths. The Triton Company, Cassabeer (New York), and Lebram Chemical Company, furnish compounds for this purpose, with directions for their use.

The technic for the artificial "Nauheim" bath is as follows:

1. Prepare the patient as in all full baths and give a few full baths in ordinary water at 90°-95° F. for 10 minutes, daily. Mild friction all over the body, without much handling of the patient, is indulged in during the immersion, and a rest of one hour should be taken after each bath.

2. If these preliminary baths are well tolerated, one pound of bicarbonate of soda and half-pound of ordinary table salt, also ten ounces of hydrochloric acid, are mixed with the bath and the temperature reduced one degree daily.

It is important to introduce the acid at the foot of the bath tub by means of a glass irrigator or tube and have it well mixed with the water before bathing the patient.

3. The bicarbonate of soda, the acid and the salt are gradually increased, day by day, and the temperature lowered until 80° F. is reached. The temperature must be regulated according to the reaction of the patient. He should not feel cold or chatter; the water should feel agreeable to the skin after the slight shock induced by the immersion has passed off. The time of immersion is gradually increased until after 10-12 baths the time is kept stationary at 20 minutes.

It might be well to add, that porcelain or wooden tubs must be used for these baths, as the acid attacks metal lined tubs and produces corrosion and destruction.

Friction is dispensed with as soon as the carbonic acid reaction becomes established and the skin requires no further stimulation.

It is apparent that these patients must be under the watchful eye of a good attendant or the physician himself, for the temperature, quantity of salines, and time of immersion depends on the favorable reaction secured.

If the patient breathes easier, feels refreshed and exhibits an improved tense pulse, the treatment can be progressively followed as outlined above, the length of immersion being in some cases extended to half an hour if agreeable.

If dyspnoea increases, the pulse becomes soft and the patient feels tired and lethargic, the baths must be given less frequently and the temperature increased. It is well to follow the Nauheim rule and take a weekly day off, which should be devoted to absolute rest.

It should be emphasized that patients remain passive during the treatments; the nurse and physician must attend to all details. If the carbonic acid irritates the bronchial tubes, have the bath tub covered and the head extruded through the covering. The attendant must see to it that the temperature of the bath remains stationary by the addition of hot water every few minutes and the occasional use of the bath thermometer to regulate the temperature.

The time of bathing found most salutary is from two to three hours after breakfast. The bath room must be well ventilated and the room temperature arranged at 70° F. The patient rests after the bath for one hour and then indulges in resistive movements or passive exercises prescribed according to the reaction obtained in each case.

The average number of artificial Nauheim baths required for apparent results varies from 20-40. During the night the patient should wear the cold abdominal bandage; this measure induces sleep and reflexly improves the cardiac tone.

PREPARED SALTS

When prepared salts are used the cakes are placed on small pieces of tin-foil in four quarters of the tub, and within a few minutes the water becomes filled with the carbonic acid gas and the salts can be intimately mixed with the water by gentle stirring for a few seconds.

For the use of *Lebram's* carbonic acid bath, the prepared powder is poured into the bath without stirring, so that the bottom of the tub is well covered. Then the contents of the bottle

marked II, is poured over the water and the stratum of air forming over it is fanned away and the patient is immersed in the tub, which is covered with a bath towel to prevent the gas from irritating the respiratory tract.

The patient is instructed to move about slightly in the tub from time to time, to induce increased activity of carbonic acid formation.

CHAPTER XXVI

DISEASES OF THE ALIMENTARY TRACT

ACUTE GASTRIC CATARRH

(ACUTE GASTRITIS; GASTRIC FEVER, BILIOUS FEVER, ACUTE INDIGESTION)

In acute conditions the drinking of tepid water or tickling of the pharynx to produce emesis will give some relief. Fasting for 24–36 hours is indicated and the cold abdominal bandage is applied. The latter is changed when it becomes warm, about every 3 hours. *Fletcherism* should be practiced as a prophylactic, *i.e.*, the food being masticated slowly and well mixed with saliva.

When the cause of the acute attack is due to some toxic ingestant, lavage may be necessary. If properly performed, lavage is also beneficial in catarrhal states of the gastric mucous membrane, but the practice must not become habitual, as it is apt to injure the mucous membrane.

If vomiting occurs the ice bag over the epigastrium acts well; heat may simultaneously be applied about the fifth dorsal vertebra, between the shoulders.

Heat will act as a sedative if pain is severe, and may be applied over the gastric area in the form of a foment, renewed every 10 minutes, until improvement is noted.

CHRONIC GASTRIC CATARRH

(CHRONIC GASTRITIS; CHRONIC DYSPEPSIA, ALCOHOLIC GASTRITIS)

In chronic gastritis, habits and diet, also care of the teeth and mouth, require the most minute attention. Unless the patient is willing to follow directions carefully, recurrences will be frequent and treatment unavailing. Proper mastication is a most

important adjuvant to restore normal conditions, and a good preliminary course of fasting, with rectal feeding if necessary to give the stomach a rest, is also essential.

Irritating foods, alcohol, spices and sometimes tobacco, must be forbidden. A warm bath taken on arising, 95°–98° F., for 10–15 minutes, followed by a brisk, cold rubdown or douche for a few seconds only, acts well as a general tonic. In the evening, on retiring, the cold, abdominal bandage will be applied, and the parts abluted with cold water in the morning on arising. When the patients can arrange to remain at home or take sanitarium treatment these cold abdominal bandages are worn during the day also, and renewed about every 3–4 hours.

Lavage may be instituted at the beginning of treatment until the gastric tone is re-established; the preference being given to the morning hours—before breakfast.

Two goblets of hot water, sipped slowly, one hour before the morning meal, should be taken after the lavage has been omitted—after the first three days—the hot water dissolves the mucus and acts as a sedative to the irritable mucous membrane. In acute recurrences the adjuvants mentioned under acute gastric catarrh will be employed.

GASTRIC ULCER

(ULCUS VENTRICULI; PERFORATING OR ROUND ULCER OF THE STOMACH)

In the treatment of gastric ulcer *rest* of the affected organ plays the most important part; the dorsal position in bed being preferred, and defecation and urination being performed dormant.

The diet should, after fasting for a day, consist of *iced milk*, or milk and small pieces of ice; the quantity of each feeding being small and gradually increased. Rectal nutrient enemata may have to be substituted in some cases.

As gastric ulcer is in many cases associated with anemia or chlorosis, the latter conditions must be combated with appropriate stimulating procedures, such as cold sectional ablutions frequently repeated, with active, though gentle rubbing and

massage. In cases of hemorrhage small pieces of ice may be swallowed and the ice bag applied over the gastric area.

Very hot rectal enemata reflexly also cause cessation of hemorrhage of the stomach; these must be given at 110°-115° F., and repeated three or four times daily.

Lavage is indicated only when no recent hemorrhage has occurred. It acts well in checking vomiting, and cleans the mucous membrane and the stomach of accumulated secretions or food.

In painful conditions hot fomentations over the gastric area (120° F.), and simultaneously over the 4th-8th dorsal vertebra, relieve promptly. The heat diminishes the motility of the stomach, causes relaxation and quiets spasm and diminishes the gastric secretion. Hot douches over the stomach area have also subserved the same indications as hot fomentations, and the Scotch douche also acts favorably. The hot douche, followed by the cold, stimulating spray, relieves conditions when heat alone does not suffice.

ACHYLIA GASTRICA

Refinement in diagnosis has shown that achylia gastrica is not as rare a disease as was formerly stated. The lack of gastric juice can, of course, be palliated by supplying dilute HCl and pepsin in definite proportions, and regulating the diet. In addition, *local* applications of ice compresses, applied for 10 minutes, a short time *before* meals, and the application of the nightly cold abdominal girdle, continued for a long period, have been of great service. General galvanization is also beneficial.

GASTRIC CANCER

(GASTRIC CARCINOMA; CANCER OF THE STOMACH; PYLORIC CANCER)

Hydrotherapy offers no relief for this frequent scourge. The application of the ice compress or ice bag over the stomach and over the respective region of the spine relieves the intense burning pain through inhibition. The swallowing of small pieces of ice also quiets the gastric mucous membrane. The writer has tried the effect of radio-active water in two cases of advanced

gastric cancer with no definite result. The action of the radium emanations on the cancer cells could not be studied as post-mortem examinations were refused. The ingestion of radioactive gelatine, which will be absorbed more slowly, may offer some hope in these cases and deserves a trial.

DILATATION OF THE STOMACH

(GASTRIC DILATATION; GASTRECTASIS; PYLORIC STENOSIS)

The various causes must, if possible, be determined in this common affection. If due to pyloric obstruction, surgical interference alone offers an avenue for relief.

The mechanical measure which is first invoked in dilatation of the stomach, if due to what ever cause, is *lavage*. A weak alkaline or normal salt solution at 90°-98° F., is employed, and daily lavage practiced until improvement warrants gradual cessation of the practice.

Restriction of fluids is essential and imbibition must be in very small quantities at a time. Meat, cereals, non-sweetened fruits, taken in small quantities, should constitute the main diet, vegetables being sparingly used.

Stimulating hydiatric measures, such as the Scotch douche, given daily with the nightly use of the *Neptune's* girdle, assist in restoring tone to the muscular wall of the stomach and relieving coincident gastropptosis. The use of sinusoidal currents and autocondensation localized high-frequency currents are also valuable factors in securing improvement. General stimulating measures, such as the quick, cold shower or the warm shower followed by the cold shower, tend to increase vital resistance and stimulate circulatory tone.

GASTRALGIA

(CARDIALGIA; GASTRODYNIA, GASTRIC COLIC, SPASM OF THE STOMACH; NEURALGIA OF THE STOMACH)

This neurosis, due to various causes and appearing at irregular intervals as *gastric crises*, must be carefully studied by the practitioner. Nervous causes must be eliminated—gastric lesions

determined and treated, constitutional diseases remedied and diet corrected.

In acute attacks heat in some form must be applied to produce relaxation and relieve pain and spasm. The hot water bag to the hypogastrium and hot compresses over the 4th-8th dorsal region simultaneously act favorably. Hot half baths (105° F.), for 30 minutes, also relieve. The drinking of hot liquids also relieves the spasms. The fluid should be sipped slowly but must be *hot* to produce relaxation.

Between attacks the patient must be instructed regarding a suitable diet; must masticate *slowly* and avoid irritable and fermenting foods.

GASTROPTOSIS

(PROLAPSUS VENTRICULI)

Gastroptosis and enteroptosis can be treated on the same broad principles. The employment of the *Roentgen* ray has been of extreme value in the diagnosis of visceroptosis, and the course of the lesions can be accurately watched during treatment, if desired. The ray has also shown that gastroptosis and *Glénard's* disease are much more common than is usually suspected.

Well-regulated exercise, following a short rest cure, with *local cold stimulating processes*, such as the *daily cold abdominal douche* of short duration, with the *nocturnal application of the cold abdominal bandage*, acts favorably in ptosis of the abdominal viscera. In women, the wearing of tight-fitting corsets must be forbidden, and physical exercise selected for each patient, depending on the symptoms encountered and the reaction obtained.

The wearing of abdominal supports and adhesive bandaging has always appealed to the writer as irrational, although as a temporary makeshift they may serve to support the prolapsed organs. Sinusoidal currents and high-frequency autocondensation currents have, in the cases treated by the writer, proven of great value as adjuvants in the treatment of this common condition.

DYSPEPSIA

(ATONIC DYSPEPSIA; INDIGESTION; HEART-BURN; PYROSIS)

The various kinds of dyspepsia—nervous, flatulent, acid and irritative dyspepsia—must be treated symptomatically, although some general principles can be laid down for the guidance of patients.

Change of scene and occupation is an essential in most cases. The manner of eating must be investigated and corrected on hygienic principles. Hasty eating, after a long fast, is particularly to be avoided. Alcoholic drinks and tobacco should be forbidden. Food should never be partaken with the patient's mind preoccupied or in a hyperemic or irritable state. Spices, saccharine, starchy and fatty articles of food must be eliminated until improvement permits latitude in this respect. Insist on perfect insalivation and prolonged mastication of all foods, excepting meats, which latter may be eaten more quickly.

Liquids with meals must be tabooed, but the drinking of cold water, two goblets half an hour before meals in hypopepsia, or hot water between meals in hyperchlorhydria, is beneficial. After the diagnosis is established, persistency in following a given course of treatment is required for ultimate results. The nocturnal cold abdominal bandage is an invaluable friend in most cases of dyspepsia. Well selected vibration and massage is also of good value. The warm shower bath given twice a day—10 A. M. and 4 P. M.—for 10 minutes each, followed by a quick cold shower, acts as a decided tonic. The treatment is usually ended by a short momentary cold douche over the hypogastrium.

ACUTE INTESTINAL CATARRH

(DIARRHEA)

When possible, the causal factors must be eliminated. Diarrhea, one of the principal symptoms of intestinal catarrh, must not be suppressed, but must be considered in most cases as a

curative effort of nature to rid the alimentary tract of toxic or foreign products, and these efforts must be abetted by colon and rectal irrigations and enemata.

In all cases accompanied with fever, rest in bed is imperative, and a semi-solid diet is prescribed. After each movement an irrigation of the rectum and colon of normal salt solution at a temperature of 75° F., for 15–20 minutes, is recommended. Cold sectional ablutions, repeated every 3 hours, assist in stimulating the dermal excretion and relieving the system of toxins. When peristalsis is excessive, cold sitz baths, 40°–50° F., of 10 minutes' duration, followed by friction of the whole body, inhibit excess of function better than opium. This extremely vigorous measure is rarely invoked, however, excepting when constant diarrhea becomes so prostrating as to constitute a menace to recovery. Between treatments the cold abdominal bandage is applied—well covered to secure reaction, and changed whenever the cloth becomes dry and warm. The use of milk products containing the lactic acid bacillus is favored when auto-intoxication or bacterial toxemia is a causal factor.

Water acidulated with fruit juices, should be imbibed in large quantities in acute enteritis—the principle of prohibiting fluids to check diarrhea being absolutely irrational.

CHRONIC INTESTINAL CATARRH

(MUCO-MEMBRANOUS ENTERITIS)

Chronicity in alvine discharges of a pathological nature point in addition to some neurosis or lesion of the intestines themselves to diseases of the liver, pancreas, spleen, anemia, tuberculosis and other infectious diseases.

Chronic intestinal catarrh is frequently associated with constipation and autotoxemia, and the consequent absorption of toxins finds a vent in the epidermis with resultant skin lesions—acne, eczema, etc. General measures directed to improve the function of the emunctories and daily irrigations of the colon and rectum with normal salt solution at 70°–75° F. must be employed. The nocturnal cold abdominal bandage should be

worn for its tonic effect and diet and exercise regulated to conform to each individual case.

Sometimes constipation alternates with diarrhea in these cases. When the latter condition pertains, the methods recommended in diarrhea will find application.

Alternate hot and cold colon irrigations, repeated twice daily, have been of service in muco-membranous colitis or enteritis. One quart of hot normal saline is retained as long as possible, and if evacuated is repeated several times. The hot solution causes loosening of the mucus and sedation; this is followed by a cold normal saline, retained as long as possible, which is given for its tonic effect. In some cases three or four seances are given daily in order to hurry resolution.

CHRONIC CONSTIPATION

This common complaint requires the most careful study and the elimination of many causative factors in diet and hygiene in order to achieve therapeutic results. Constipation is successfully treated by means of medicines, diet, exercise, massage, electricity, suggestion and hydrotherapy. There are, however, many cases which resist the most approved therapeutic measures and recent studies by means of the *Roentgen* ray—bismuth meal—have shown that surgery should be invoked in a large number of chronic, intractable cases. The *Roentgen* ray demonstrated that adhesions, adhesive bands about the intestines, and constrictions of the lumen of the bowel as well as frequent enteroptosis account for failures in ordinary treatment. Abnormal conditions in the sigmoid and rectum must also be sought for and corrected, if present. Thus, sphincteralgia, sphincterospasm, fissures, fistulæ, hemorrhoids, pouches and rectal neuritis, directly and reflexly, prevent evacuation and render nugatory the best efforts of the prescriber. Uterine displacements are also a frequent cause of constipation.

Hydrotherapy is particularly indicated in constipation due to *atony*; also in *spastic* conditions of the bowels.

Atonic constipation responds to general constitutional treatment, such as daily baths (85°), for 10 minutes, with cold ablu-

tion, nocturnal application of the cold abdominal bandage and cold intestinal irrigations. The latter are applied every other day only, the temperature of the water being applied at 85° F. at the beginning and gradually reduced, treatment after treatment, until 60° F. is reached.

Cold half baths with affusions to the abdomen are also serviceable. These baths are given twice daily.

The drinking of sufficient water at proper intervals, as pointed out in the chapter on Imbibition, is also of great importance in the treatment of these cases.

The use of the enema to clear the lower bowel is a mechanical contrivance employed for ages. While indicated frequently and of great assistance in many cases, its abuse tends to aggravate the condition of the lower bowel, and general measures should be preferred to its constant use.

In spastic constipation the use of hot irrigations has been followed by excellent results. The temperature of the water must be at least 105°–115° F. to produce results, the volume being one quart—repeated several times at one seance, if necessary, to achieve an evacuation.

Conditions of the alimentary tract and liver, which contribute to rendering constipation chronic, are touched upon in the respective chapters.

Hydrotherapy, while a valuable adjunct in the treatment of constipation, must not be relied upon to the exclusion of hygienic, dietary, electric and medicinal agents of known value, but can be combined with all without detriment to the patient.

OBSTRUCTION OF THE BOWEL

(PARALYSIS OF THE BOWEL. PARESIS OF THE BOWEL)

The writer has had occasion to be called to a number of cases of obstruction of the bowel following chronic constipation, a majority of cases occurring after laparotomies and gynecological operations. These cases in the stage when seen by the writer are often fatal, but a goodly percentage has been saved by means of hydro-electric treatment, so that insertion of the technic of

the treatments is justified at this point. The dorsal position in which the patient rests is usually not disturbed; a solution of one-half strength normal salt solution is prepared at a temperature of 105° F., and by means of the *King* rectal electrode and an attached *Davidson* syringe, one quart of the solution is slowly injected into the bowel. A portable apparatus containing a faradic and galvanic battery has its negative rheophore attached to the rectal electrode, and a large 4 x 6 inch abdominal felt electrode is placed over the ascending colon or slightly to the left of it. The method we have found most successful is to apply a moderately strong faradic current (high tension) for from three to five minutes, to be followed immediately (unless prevented by expulsion of fluid or fecal masses) by galvanic treatment, the positive pole over the abdomen with 15 m. a. current.

The galvanic current is interrupted at intervals of one minute for a few seconds only, and treatment continued for 10 minutes, unless interrupted by discharge. Where impaction or paralysis has been of many hours' standing, it is necessary to repeat this technic every 4 or 6 hours, depending on the severity of the case, until tonicity of the bowel is restored and evacuation becomes normal. In several apparently hopeless cases persistent treatment for three days, with 4 treatments within 36 hours, resulted favorably. Even when evacuation has occurred, it is prudent to give a few additional mild galvanic treatments in order to prevent recurrence and stimulate the sympathetic system.

HEMORRHOIDS

Patients suffering from hemorrhoids usually apply for relief when the condition has reached a stage where surgical interference is productive of most relief. The use of the new rectal high-frequency or fulguration treatment for this condition threatens to supplant surgery in these advances cases, as there is no detention from business and no complication of any kind following its use. Hydrotherapy applied by means of the T bandage, can be invoked for relief in early cases—cold to produce contraction and stimulate local conditions and relieve stasis; heat to relieve spasm. Ice acts as a styptic for bleeding

hemorrhoids, and cold compresses applied over the sacrum and perineum, assist in checking the flow of blood.

Hemorrhoids must not be considered a local disease *per se*—but should be combated as a local manifestation of a general disturbance most frequently referable to the portal circulation and the liver. Carbonacidemia, if chronic, also tends to hemorrhoidal conditions, and this basic cause must be removed before permanent relief can be obtained.

PROLAPSUS ANI

Persistent employment of cold has been curative in prolapsus ani. It is best applied by means of the T bandage firmly strapped over the perineum and anus with several pads of gauze soaked in ice water. The pads are remoistened every 30 minutes for two hours, and reapplied 3 or 4 times daily, and the patient is kept recumbent during treatment. As a rule the treatment, if given in a case of some standing, is most conveniently applied *at night* so that detention from school, etc., can be avoided.

APPENDICITIS

Hydrotherapy is applied in appendicitis for a number of symptoms. In early attacks the continuous use of ice compresses check inflammation, and should be followed within twelve hours by hot compresses to relieve spasm and produce absorption of any exudate. Surgery has proven so successful in this disease that it is often invoked after slight attacks, when rest and cold followed by hot applications would restore normal conditions after a catarrhal inflammation. If purulent conditions are, however, suspected, the use of the knife should be peremptorily advised and no delay counseled. Catarrhal attacks of appendicitis should be treated for a long time to improve local conditions, and the cold compress applied over the affected region should be advocated as a *nightly* expedient, to be followed for *many months* until the physician is assured of restitution of normal conditions.

PERITONITIS

Peritonitis may be acute or chronic; in the former we differentiate the circumscribed and diffuse attacks; in the latter, tubercular, carcinomatous, interstitial or sclerotic. In acute attacks hydropathic adjuvants are useful to alleviate numerous symptoms—*thin, gauze* compresses (not too heavy) rinsed in water at 45°–50° F., and changed every 5 minutes, are beneficial in checking the spread of the inflammation; when the fever has subsided, the application of *hot compresses* must be inaugurated—thin layers of gauze being applied (102°–105° F.) constantly for one or two days, to produce absorption of exudates and obviate adhesions.

Irrigations of the bowel with water at 100°–105° F., for one hour or more three times daily, are employed when the *acute stage* has passed in order to relieve spasm, reflexly cause resorption and clear the bowel.

Retention of urine requires catheterization or the application of hot fomentations over the pubes may be tried for a short period before resorting to the catheter.

Abstinence from food is required, the imbibition of a wineglassful of water every hour acidulated with lemon juice, pineapple juice or any other fruit juice preferred by the patient should be advocated to quench thirst and keep active the emunctorial function.

In chronic peritonitis the symptoms as encountered must be combated with cold or hot applications, depending on the results required. The frequent good results following laparotomy in these cases indicate that the local hyperemia induced by the surgical interference is the probable factor in the cure and continued applications of heat to produce the same physiological results would seem to be the rational procedure. The reported cure of several cases of tubercular peritonitis following prolonged “sun baths” of the abdomen would seem to corroborate these points.

Kothe (*Therapie der Gegenwart*, No. 10, 1907) recommends *continuous irrigation* of the rectum with normal salt solution, at

100° F., in *diffuse* and in *chronic* peritonitis. He believes laparotomy to be contraindicated twelve hours after the symptoms of *diffuse peritonitis* are noted.

Irrigation must be *very slow*, the irrigating vessel being placed at 15–18 inches above the level of the patient, and from 6–8 quarts of the solution being used in 24 hours. Irrigation is kept up even when the patient sleeps. When distress is experienced the rectal tube is disconnected and fluid or fecal matter evacuated. The nurse must be instructed to watch the flow of the saline and to add hot saline from time to time in order to keep up an even temperature. Treatment is continued until all symptoms of peritoneal inflammation have subsided.

CHAPTER XXVII

DISEASES OF THE LIVER

HYPEREMIA OF THE LIVER

(BILIOUSNESS)

The causal factors in this common lesion must be eliminated in all cases—gluttony, alcoholism and sedentary habits corrected and moderate, systematic exercise advocated. The abdominal bandage applied at night (cold) is invaluable in acute cases, and alternate hot and cold compresses (hot 1 minute, cold 5 minutes) kept up for several hours tend to restore normal circulation. Irrigations of the bowel twice a day with water at 75°–80° F. also tend to restore tone to the liver and relieve constipation, which is a frequent accompanying symptom.

Chronic lesions of the liver can be palliated by the judicious application of the various modalities of cold and heat, as indicated by the symptoms.

ACUTE CATARRHAL JAUNDICE

Resolution in acute catarrhal jaundice can be hurried by high enemata of hot water applied three times daily, and the local application of alternate hot and cold compresses. The hot compress is applied at 120° F. for one minute, and is followed by the application of cold for five minutes. This alternation is kept up for one hour and repeated every six hours—about three times daily. The drinking of liberal quantities of hot lemonade or other fruit juices is also beneficial.

Patients subject to attacks of catarrhal jaundice should be instructed to apply the nocturnal abdominal cold compress for a period of several weeks, and repeat the process for one week every month for six months or longer, in order to secure normal tone to the affected parts.

Hot full baths are sometimes valuable to relieve the itching of the skin caused by the jaundice—they should be arranged at 100° F., and the heat gradually added until 105° F. is reached.

The cold turban about the head must be renewed frequently during the immersion to prevent cerebral congestion. The duration of the immersion is rarely over 5–10 minutes, but can be gauged by the vitality of the patient.

CHOLELITHIASIS

(GALL-STONES)

In acute attacks of cholelithiasis hot half baths relieve the spasm if the immersion can be given at 105° or 110° F. In some cases the alternate application of hot fomentos 5 minutes, followed by cold compresses for two minutes, repeated for several hours, has relieved the acute symptoms.

Irrigations of the intestines with hot water, as hot as can be borne—has also relieved the spasm, and the latter procedure has the particular favor of the writer. Between attacks, when operation is refused or deferred, the application of the cold abdominal bandage applied every night with a special pad of moist, cold gauze over the affected region is advocated, and has in several cases been of signal benefit.

CHAPTER XXVIII

DISEASES OF THE KIDNEY

For the purpose of this volume we will treat of:

1. Acute diffuse nephritis (croupous or parenchymatous).
2. Chronic diffuse nephritis (croupous or parenchymatous).
3. Chronic interstitial or catarrhal nephritis.

The close physiological relationship of the sudoriparous glands and of the kidneys has been touched upon in previous chapters, the fact being emphasized that the volume of the urine can be diminished or increased by reversed activity of the skin. Thus the urinous odor of the skin of patients suffering from chronic nephritis is characteristic, showing as it does the attempt of the skin in taking up the excretory function which the impaired kidneys are unable to properly perform. Experiments have also shown that impairment of dermal function from the action of excessive cold or heat or from mechanically closing up the sweat glands with a varnish, induce hemoglobinuria, albuminuria and uremia. In all diseases where dermal function is attacked to a marked degree—as in small-pox, scarlet fever and diffuse skin lesions—the complication or sequela of nephritis is rarely absent. These observations point to the skin as an important organ for therapeutic action in nephritis.

In acute nephritis, half baths at 102°–105° F., for 20–30 minutes, with cold compresses about the head during immersion, and the imbibition of one or two goblets of hot lemonade during same, are favorite measures. These hot half baths are repeated three or four times daily, and gradually diminished in time and frequency, as improvement ensues. The hot pack or hot blanket pack is substituted in some cases when the half bath fails to act. The patient is kept in the hot pack half an hour, if possible, and the pulse and heart action closely watched. *All draughts* and cold must be avoided during these treatments; the bath room

and bedroom must be kept warm so that no chilling of the skin takes place. Contrary to the teachings of former times, liquids must be given freely—pure water acidulated with fruit juice being given in quantities of two to three ounces every half hour—diminution of the quantity depending on the patient's aversion to same. Diluted fruit juice and milk foods should constitute the only diet until improvement is marked.

In cases of anuria the irrigation of the bowel with hot water—one quart, at 105°–110° F.—every 2 hours, as a rule reflexly restores renal function.

The patient is instructed to retain as much of the hot water as possible during the treatment. This measure cannot be too highly commended, as it has been life-saving in many instances.

The writer is accustomed to advocate the hot irrigations once a day in all cases of acute diffuse nephritis, and in exacerbations of chronic diffuse nephritis where the daily volume is much diminished. The irrigation is given in such cases immediately *after* the hot half bath.

In acute recurrences of chronic diffuse nephritis the same measures are applicable as in acute diffuse nephritis, excepting that the amount of dilute fruit juice and milk foods are given more sparingly; usually one or two ounces every hour, the fruit juice and milk foods being given at alternate feedings.

Chronic diffuse nephritis does not require the active measures of acute or recurrent attacks. Prophylaxis as regards chilling the skin, dietary precautions and general hygiene must be followed and remedies as indicated prescribed. The use of electric light baths, also of hot-air baths, taken under careful supervision of the physician, is to be strongly recommended in chronic cases. The time and frequency must be regulated by the individual reaction. As a rule two hot-air baths or one electric light bath weekly are sufficient to stimulate the function of the sweat-glands and give good results. The patient must be cautioned against leaving the room too soon after such applications, but should rest on a couch in a moderately warm room fully one hour after the treatment. The wearing of linen-mesh underwear and of a special bandage about the kidney region during cold weather is also recommended.

Chronic interstitial nephritis and its sequel, cirrhosis of the kidney, require the same general measures as outlined above. In this condition as well as in chronic diffuse nephritis, the daily prolonged hot half bath—102°–105° F.—for 30 minutes, is of excellent service in checking the progress of the disease.

The carbonic acid baths or "Nauheim" baths serve a similar purpose to above measures, but they have no specific advantage over plain hot water. It is the stimulation of the sudoriparous glands and resulting relief of the kidney insufficiency which is the chief therapeutic factor in these treatments, and they can be carried on at home under careful supervision better than at an overcrowded watering place.

UREMIA

Uremia, as well as delirium tremens, is the exhibition of almost complete kidney insufficiency, and active measures are imperative in order to save life.

Hot blanket packs, for 30 minutes, followed by a quick, active, cold ablution, and a subsequent hot colon irrigation of 30 minutes' duration—these measures alternated until improvement is manifest, are the treatments to be relied upon. A cold compress is applied over the precordial area during the hot pack, and renewed every 10 minutes. Hypodermoclysis is also of advantage, but the colon irrigations are safer and have the same physiological action. The hypodermoclysis acts *more rapidly* and is to be invoked where the emergency demands it.

GRAVEL—RENAL CALCULUS

In a number of cases where the *Röntgen* ray was able to demonstrate the presence of small calculi and gravel the persistent drinking of distilled aerated water, two or three quarts daily, in addition to a milk and semi-solid diet, has proven curative. The writer has in mind the case of a patient æt. 75, where a small calculus was diagnosed and where the other clinical symptoms agreed (hematuria, dysuria, etc.), in which the drinking of distilled aerated water for one year relieved all symptoms and apparently affected a complete cure.

CHAPTER XXIX

DISEASES OF THE BLADDER

Acute catarrhal cystitis demands palliation of the dysuria by means of hot sitz baths, 105°-115° F., given for 20 minutes to one hour, three or four times daily. Between treatments hot fomentations are applied over the pubes and perineum. Rest and bland liquid or semi-solid diet must be enjoined.

Acute recurrences of chronic catarrhal cystitis demand the same local treatment. Where the sitz baths are not procurable the hip bath or half bath is substituted, the upper portion of the trunk of the patient being well enveloped in warm blankets. Hot water bags, or preferably *light gauze*, rinsed in hot water, placed over the pubes, will relieve distress and assist micturition.

Irrigation of the bladder will be instituted when acute symptoms have abated. The method described by *Hunner (qui vide)* deserves extended trial in chronic and ulcerative attacks.

ENURESIS NOCTURNA

Hyperesthesia of the Bladder

The causal factor in these cases must be removed or ameliorated, if possible, before expecting therapeutic results from hydrotherapy. Both conditions, although the former is usually found in children, the latter in the aged, require restoration of local tone for improvement. The use of galvanism has been of service and its combination with faradism still more so. Hydrotherapeutically, hot sitz baths, of 10 minutes' duration, followed immediately by a *cold* sitz bath, 50°-60° F., of 2 minutes' duration, a quick drying and return to bed has been efficient in some cases, if persisted in for three or four weeks. The treatment can be most conveniently given at bedtime. Where time permits it

may be given morning and night. All irritants and excessive liquids (alcohol and tobacco) should be avoided. Raising the foot of the bed 12-18 inches has also been of service in preventing irritation of the sphincter, and abstention from liquids after 5 or 6 P. M., is also desirable.

The static wave current applied by means of the rectal electrode, has been efficient in several chronic cases of enuresis in the writer's practice. Treatment is given for 20 minutes, tri-weekly, with a spark-gap of about one inch.

CHAPTER XXX

DISEASES OF THE MALE GENITAL ORGANS

URETHRITIS

(GONORRHEA)

Hydrotherapy is a valuable adjunct in inflammation of the urethra, whether simple catarrhal urethritis or gonorrheal in origin. Although it is difficult to induce patients to rest in bed, quiet and abstention from exercise is important for prompt results.

In ambulant cases cold compresses, which are applied hourly, about the penis in bed cases must be omitted; the patient can, however, indulge in warm sitz baths, 90°-95° F., morning and night, of 30 minutes' duration, and if chordee is present increase the temperature to 110°-115° F., to secure relaxation and relief from pain. The *Valentine* methods of irrigation depend, in our opinion, on their success not on the antiseptic fluid, but on the cleansing of the mucous membrane by an aseptic fluid. Irrigations of sterile water will serve the same purpose and must be performed with due precaution, using no force and tempering the water at 95° F. Three or four irrigations daily, with subsequent sitz baths as indicated above, will assist the organism in combating the infection.

EPIDIDYMITIS

Orchitis

These painful complications require prompt palliation, and there are no safer agents for this purpose than hot fomentos or hot sitz baths. The hot sitz baths are taken at 110° F., or higher, for 20-30 minutes, and repeated every 3 or 4 hours, if necessary.

Between the sitz baths, hot fomentations (hot wyc-hazel has many advocates) are kept about the scrotum, and the latter is raised or strapped upward so as to avoid tension. The application of heat relieves the pain and produces absorption, besides inducing a passive local hyperemia which is inimical to bacterial life.

PROSTATITIS

(PROSTATORRHEA)

In acute attacks of prostatitis the measures advocated in gonorrhea are equally efficacious. In chronic catarrhal prostatitis, hypertrophy of the prostate gland and prostaticorrhea palliation and in some cases curative results are achieved by the following procedures. The patient is instructed to take an alternate hot and cold sitz or half bath, morning and night; starting with the hot sitz bath at 100° F., for 15 minutes, and following the hot immersion by the stimulating cold (60° F.) sitz bath, of 2 or 3 minutes' duration. These treatments must be taken for several months before tonicity of the affected organs is achieved. After the treatments the patient should rest for half an hour so as to permit proper reaction following the cold immersion.

CHAPTER XXXI

DISEASES OF WOMEN AND OBSTETRICS

VAGINITIS

Simple catarrhal or gonorrheal vaginitis is benefited by means of hot irrigations frequently repeated. Hot sitz baths are also serviceable and should be prolonged to one hour to achieve the best results.

ENDOMETRITIS AND METRITIS

In acute inflammations of the endometrium and the uterus proper *cold local pelvic packs*—the cloths being changed every 20 to 30 minutes, are of service in checking the spread of the inflammation. When the inflammation is of a chronic character and there are pelvic adhesions and tubal or ovarian complications, the use of heat is indicated.

The reputed specific value of the Franzensbad Moor-baths and other hot applications is referable entirely to the *specific* action of *heat* and nothing else. Hot pelvic packs or hot sitz baths produce local passive hyperemia and relaxation of tissue. If followed by short, stimulating cold ablutions, the reaction is always beneficial, and absorption of exudates and improvement in local circulation follows.

These pelvic packs or sitz baths should be given in gradually increased frequency, so that the daily pack given for 20 minutes the first day is supplanted by three or four packs at the end of the week, given for 30 minutes. The patient, if she chooses, may receive a short, cold full or half bath instead of the cold abluion which usually follows the hot applications. The alternation of the hot pelvic pack and the hot sitz bath has many advocates—the latter procedures permit of the simultaneous application of the hot return-flow douche

while seated in the tub. The hot return-flow douche is recommended as a daily treatment in all chronic pelvic inflammations, and if used judiciously it is of distinct benefit according to the same principles outlined above. *Walzer's* return-flow irrigator, described in a previous chapter, is particularly recommended for the application of heat to the uterine and vaginal tissues.

MENORRHAGIA

Excessive cold (ice) and excessive heat—both have styptic action, and can be applied either singly or alternately. A T bandage covering ice compresses applied over the vulva and perineum, which are renewed every 2 minutes, checks hemorrhage in nonmalignant cases promptly. Steam applied by means of the jet douche also acts as a styptic, and is employed particularly in cancerous states where the steam also destroys the odor to some extent.

DYSMENORRHEA

If due to mechanical reasons—stenosis—the use of hydrotherapy is of but little value in dysmenorrhea, although hot applications may induce relaxation and give relief. In spastic dysmenorrhea hot sitz baths relieve invariably. The patient is instructed to take the hot sitz bath *daily one week* before the expected flow, and on the day of the period to take two or three prolonged hot sitz baths until the flow is established. If these measures are followed for a number of months gradual relief from pain will ensue and normal menstruation be established.

AMENORRHEA

The causal factors of amenorrhea must be sought and combated, if results from any measure are to be expected. Thus, obesity, tuberculosis, anemia and chlorosis, when the primary cause, must receive first attention. Measures directed to improving pelvic circulation will assist in bringing about the monthly flow. Thus treading water—cold—for 10 minutes, morning and night, will be serviceable. Cold compresses about

the inner thighs, applied at night and covered with flannel, is advocated by some observers. The short, cold sitz bath, 1-2 minutes, taken daily or twice a day, is also serviceable. The cold spray over the lumbo-sacral region, after the morning neutral bath, is also beneficial.

OVARITIS

(OVARALGIA)

Relief from pain is secured in ovaritis and ovaralgia by means of heat—hot fomenta—hot water bags and the hot pelvic pack. These measures can be timed and repeated, depending on the results achieved.

OBSTETRICS

In obstetrical practice the use of heat and cold is serviceable in combating a number of symptoms.

Thus the well-known relaxing effect of heat is utilized in cases of retarded labor from *rigid os* or *perineum*. Heat over the pubes and over the perineum produces relaxation if applied assiduously in very short time.

Hyperemesis is often relieved by the simultaneous application of heat over the epigastrium and cold along the lower dorsal spine. To stimulate *contraction* during labor a short, cold sitz bath or half bath of 1-2 minutes' duration has been specific in many cases.

Eclampsia is treated with the hot blanket pack or hot full baths of one hour's duration. The colon irrigation method, with water at 105° to 110° F., kept up for half an hour, has also been highly commended by hydrotherapists.

Postpartum hemorrhages respond to ice compresses continually applied against the vulva, with efficient vaginal packing and mechanical pressure.

Puerperal fever is favorably influenced by cold pelvic packs or cold general packs repeated every 6 hours until improvement is noted. Colon irrigations, 70°-75° F., kept up for one hour,

morning and night, also acts promptly in relieving the economy of toxins and lowering temperature.

Sapremia reacts favorably to hot sponging or hot sectional ablutions—the nurse being instructed to go over the whole body three times at one treatment, and to follow the hot sponging with a vigorous cold ablution. This technic is repeated twice a day in ordinary cases, and the reaction secured is usually prompt.

Retroflexion following childbirth may be influenced by cold rectal irritations repeated three times daily. The cold reflexly causes contraction and stimulation of the uterine supports and assists in restoring normal conditions.

Subinvolution is improved by hot vaginal irrigations preferably with the return-flow irrigator (*Walzer*). Two quarts of hot water, 110°–115° F. are employed for each irrigation. The latter is advised twice daily.

Varicosities during or following the puerperium are treated by applying cold compresses, well covered and firmly bound over the affected area. They are renewed every 30 minutes.

Hematoma of the vagina or vulva reacts favorably to alternate hot compresses or fomenta applied for 5 minutes, followed by cold compresses for 1 minute, repeated 3 times every hour.

Atony of the uterus is benefited by massage of the uterus through the abdominal walls and irrigations per vaginam with cold, sterile water. To intensify the stimulating and nutritive action of the cold it is advisable to irrigate first with hot water for 5 minutes, then follow with the cold irrigation for 10–15 minutes, repeating this technic two or three times daily, if necessary.

In *asphyxia neonatorum* the alternate hot, followed by cold immersion of the body relieves the economy of CO₂ excess and stimulates the vaso-motor nerves. The process must, in some cases, be repeated several times before the crying of the child gives assurance of returning vitality. Spanking and swinging of the child and artificial respiration must also be resorted to in some emergencies.

In order to avoid infection of the cord, bathing is preferably dispensed with until the navel becomes normal. The child can be sponged daily with warm water, 90°–95° F., and receive a cold

spinal ablution for its tonic effect. After ten days the daily bath, 90°-95° F., can be given with friction over the whole body and, if possible, this hygienic and therapeutic measure should be continued right along. It is incomprehensible why this measure is discontinued after the first year—its value is fully as great in later years as it is in infancy—and many diseases of childhood would be obviated if the daily warm bath followed by the cold stimulating ablution or showers be continued indefinitely.

Puny, anemic and toxemic children improve under the action of prolonged, warm full baths of one hour's duration. These baths are followed by cold sponging, and the patient is put to bed and warmly covered to await reaction.

CHAPTER XXXII

DISEASES OF THE SKIN

Paradoxical as it may seem from the fact that the skin can be so readily treated with hydiatric measures—its functions and nutrition being stimulated or inhibited at will—dermatologists as a rule forbid the use of these measures in most skin lesions.

The success following prolonged immersion in the warm bath after severe scaldings, of the continuous hot bath in pemphigus and of the splendid results attained at Leuk-Bad in Switzerland, in chronic eczema and other skin lesions, have not changed this attitude of the profession.

The late *Professor Lassar*, of Berlin, some time before his death, made a strong presentation of the value of hydrotherapy in dermal lesions confirming the previous statements of the *Winternitz* school *in toto* and opening up a new era in dermatological practice.

The prophylaxis of dermal cleanliness will be promptly acknowledged when we recall the many skin lesions that are due to filth—plus a deteriorated general circulation; thus localized lesions due to mold-fungi as *tinea versicolor*—*favus*, ringworm, etc.—are due to contact and subsequent growth upon congenial soil.

Skin lesions which the consensus of study attribute to some constitutional dyscrasia, such as eczema, lichen, psoriasis, etc., certainly present the best opportunity for curative action in a course of treatment affecting general metabolism, such as hydrotherapy offers. Such treatments combined with dietetic and hygienic regulations have been in vogue with the *Winternitz* school for many years, and many intractable cases which failed to respond to local treatments have reason to ascribe their improvement to above methods.

Diseases due to disturbances of the nervous system—such as herpes zoster, leucoderma, pruritus, etc., are included in this category.

Many skin lesions are due to toxines or toxemia and in these instances also the powerful emunctorial stimulation afforded by hydrotherapeutic measures can be called to aid.

The scope of this volume prevents the discussion of the whole list of dermatological lesions; the important diseases which will be touched upon will give a general conception of the action of hydrotherapy in this specialty in medicine.

ECZEMA

Acute eczematous eruptions are treated by wrapping up the parts affected with soft linen cloths and sprinkling or moistening same every 15–30 minutes with cold water. The pain and itching which is intensified at the beginning will subside in due time, and the lesion will, after persistent treatment, show improvement. A daily hot dry pack followed by cold ablutions is a routine addition to the above local treatment.

Chronic eczema requires hot packs and Russian baths followed by cold ablutions or affusions. A bland diet—cereals, vegetables and sour milk—is of great benefit in these lesions as well as in psoriasis and many other skin diseases.

Psoriasis has been successfully treated by prolonged hot baths—100°–102° F.—the patient remaining in the water for 3–4 hours at a time. The hot bath may be alternated *every other day* with the hot, moist pack in which the patient remains for several hours, if possible. As these measures are depressing and relaxing to a great degree, they are always followed by short, cold procedures—affusions—showers or mild douches to restore the tonicity of the blood-vessels and the skin. Treatment in chronic eczema and psoriasis must be directed to remove the underlying dyscrasia with appropriate remedies in addition to the great aid to metabolism and elimination offered by these simple hydiatric measures.

In chronic ulcers—non-specific—there is no better stimulant to produce granulation tissue than *cold, sterile water*, with which

the gauze covering the ulcer is moistened every 30 minutes. Even in specific ulcers the combination of the cold stimulating gauze dressing in combination with the indicated remedy has hurried resolution as compared with specific medication alone.

In severe burns the continuous bath, 100°–102° F., acts as the best analgesic. The patient is suspended in a hammock in the tub and the temperature of the water is kept stationary by frequent additions of hot water. Some apparently hopeless cases have responded favorably by the *continuous* hot bath treatment extending over many weeks. The continuous hot bath has also been serviceable in *pemphigus*—the patients thus treated remaining in the bath for many weeks.

Lesions accompanied by excessive itching—pruritus, urticaria—are palliated by *hot compresses* and the steam douche.

Erysipelas, as pointed out in a previous chapter, also responds to local hyperemic and stimulating applications of cold.

Localized mold fungi infections—tinea and ringworm—are quickly destroyed with the steam-jet douche, and the supervening local hyperemia prevents recurrences, if a few spores should persist.

CHAPTER XXXIII

DISEASES OF THE BLOOD AND BLOOD-VESSELS

ANEMIA AND CHLOROSIS

As pointed out in the chapters on the physiological action of hydrotherapeutic agents on the blood, cold procedures of *short* duration increase the quality as well as quantity of blood to the parts treated. Hemoglobin is increased and the red and white blood corpuscles augmented.

That this increase is not due to local hyperemia alone has been demonstrated by subsequent blood examinations which showed an absolute increase in the blood constituents after a judiciously applied course of cold stimulating procedures when these had been interrupted for this purpose. The conclusion drawn points to the stimulation of the hemogenetic organs and the more rapid introduction into the blood stream of newly formed cellular elements and hemoglobin.

To achieve good results in anemia and chlorosis, the technic of treatment must be understood, and the mere fact that cold is a stimulant must be opposed by the fact that excessive cold is a depressant, and that too much abstraction of heat rather increases than diminishes anemic conditions. The technic of treatment should consist:

1. In supplying the body with nutrition suitable for the present digestive ability of the organism. Milk foods of all kinds are most desirable. Green vegetables, lettuce, cress, spinach, chard, beans, peas, lentils, fruit in abundance, and lastly, meats as desired by the appetite of the patient. Eggs and cereals of all kinds are added to the dietary.

2. Imbibition of water between meals and malt drinks with meals; porter preferred.

3. In the morning on arising and with the body in a *warm* condition, a short cold half bath, lasting 2 minutes, with active friction. During the afternoon, two hours after the meal, a dry pack until the patient is moderately warm (not perspiring), and in this *warm* state another half or full bath—cold—of 2 minutes' duration, with active friction. In the evening on retiring, the drinking of one pint of malt liquor, preferably porter. If porter disagrees numerous proprietary malt preparations may be chosen from.

The baths should be positively cold—arranged at 60°–65° F.—but if the patient objects strenuously they may be started at 85° F. and gradually reduced, day by day, until the lower temperature is well borne. The important point in the bathing to remember is the preparatory *warming* of the body before immersion—the shortness of duration of same—and the active friction during the bath.

A cold shower subsequent to a warming process may be substituted for the bath, if it is preferred by the patient.

ARTERIO-SCLEROSIS

Arterio-sclerosis, at this writing, in the limelight of medical investigation, can be markedly benefited by hydrotherapeutic measures. Based on the physiological action of heat and old *on the blood-vessels*, the writer has for some years advocated the following measures:

1. In the morning, on arising, a warm full bath, 92°–98° F., of 10–15 minutes' duration, during which the patient *relaxes* thoroughly. The bath to be followed by a quick, cold ablution or shower of 1–2 minutes' duration. This bath may be repeated in the afternoon or an hour before retiring, if the case demands it. This bath is also recommended as a prophylactic for tendencies of an arterio-sclerotic nature. The action of the warm bath is to produce moderate relaxation of tissues, including the muscular coat of blood-vessels, the subsequent short, cold application producing contraction with secondary dilatation, which again becomes normal when the patient walks about for five or

ten minutes in a nude state, takes an air bath (in a well-ventilated room without draughts) and then dresses or retires to bed.

The alternate heat and cold exercises the blood-vessels; they retain their tonicity and their nutrition by means of the vasi vasorum is kept at par. The blood pressure, by means of the *Riva Rocci* apparatus, shows distinct improvement after a course of these baths combined with the air baths.

The latter procedure the writer considers an important addition to the bath itself, its tonic stimulating properties being acknowledged by all who have investigated its value.

CHAPTER XXXIV

DISEASES OF THE MUSCLES AND JOINTS

Contraction of muscles are treated by means of *heat* plus friction. Either localized steam or hot-air treatment or hot, frequently renewed fomentations are employed. These relaxing treatments must always be followed by active friction with *cold* water. Both tonic and clonic contractures usually respond to the combination as outlined above.

Myositis—acute attacks of myositis are treated with cold or ice compresses—which are renewed every 15-30 minutes; previous to each renewal the parts are actively *rubbed* and kneaded. In *chronic myositis* the use of local or general heating measures, such as the Russian bath or hot-air bath, followed by cold showers or ablutions, are recommended. The frequency of these powerful agents depends on the reaction of the patient, and must be carefully supervised by the physician.

Localized muscular rheumatism—so-called *lumbago*, deltoid, etc.—responds to the alternate application of heat, followed by cold. The Scotch douche acts promptly. In lieu of this measure *hot fomentations* will be applied for one hour, renewed every 5-10 minutes, each renewal to be followed in turn by *active ablutions* of cold water plus friction, tapotement and kneading. After one hour's treatment the parts are warmly covered and the patient rests for 3-4 hours, when the process indicated above is repeated if necessary.

Atrophy of muscles, for which faradism and galvanism is the treatment of choice, is also benefited by active cold ablutions with friction performed 3 or 4 times daily. The Scotch douche also acts well in these cases.

Acute articular rheumatism is palliated with hot fomentations frequently renewed. When the acute pain has subsided active

stimulating measures, such as *cold affusions*, cold douches are invoked, repetition and duration depending on the individual reaction.

Chronic articular rheumatism requires a long period of eliminating and stimulating treatment. Hot-air baths, Russian baths, localized steam baths, are called to aid in producing relaxation and absorption. These measures must in all cases be followed by short active procedures—cold affusions or ablutions with passive and when possible active movements.

Some cases of **Arthritis deformans**, when not of too long standing, have responded to the prolonged action of hot-air baths plus stimulating and general treatments.

CHAPTER XXXV

DISEASES OF THE NERVOUS SYSTEM

In the chapter on the physiological action of hydrotherapeutic measures upon the peripheral and central nervous system, it was shown what valuable therapeutic aids we possess in the various modalities of heat and cold applied mildly, moderately or strenuously, as the case may require. In addition, the valuable *suggestive* properties of these manifold measures in functional disturbances were briefly touched upon. The elimination of toxins—so frequently the basis of nervous lesions—can be hurried and functional activity of *all organs* stimulated or diminished as the case may demand. It is not surprising, therefore, that all sanatoria receiving nervous and mental cases make more or less effort and display along hydrotherapeutic lines, as the results under careful supervision and intelligent direction are certainly most gratifying.

It will be impossible, within the limits of this volume, to cover the whole field of nervous diseases; the observing practitioner can, from the study of a few prominent diseases, appreciate the weapons placed at his command by hydiatric measures and *each case* must perforce be treated on its *individual symptoms* and its treatment modified, depending on the reaction and results achieved. Neurasthenia, the disease which, owing to present civilization, has a large number of victims and has many manifestations which demand various treatments, offers a great field for hydrotherapeutic applications.

NEURASTHENIA

As the term neurasthenia covers a multitude of sins of omission in diagnosis it is essential to make a most careful anamnesis and physical examination—including urinary, blood and *Roentgen* ray examinations, to eliminate, if possible, the causal factor.

Thus, inherited tendencies must be noted—while not contradicting favorable results, such cases demand more time and recur more readily than those of good family history. Carbonacidemia and anemia are frequent causes of neurasthenia. Organic lesions of the brain, eyes, ears, alimentary tract (visceroptosis), heart, lungs, liver, kidneys, pelvic organs (especially prostate gland and uterus) must be looked for, and treatment directed primarily to the affected organs before the reflex nervous lesion can be permanently relieved.

Conjugal incompatibility, sexual excess, masturbation, sexual continence, habits of over-indulgence in coffee, tea, tobacco, drugs and alcoholic beverages, must be modified or controlled. Removal from uncongenial surroundings must be advised.

Overwork, worry and stress are three great factors in the production of asthenia of the nerves. Loss of property, loss of position, loss of members of the family or dear friends, are all factors to be reckoned with, so that the physician who undertakes to treat cases of this nature successfully must combine with his professional attainments the qualities of a philosopher and interested friend.

Hygienic regulations must be carefully gone over—habits regulated and precise instructions given for daily comportment and treatment. For this purpose it is essential to supply the neurasthenic with a little book in which his daily routine is carefully marked out for him. Hydrotherapeutic measures can be so regulated with intervals of rest or exercise, as the case may demand, that the patient is kept busy, has no time for retrospection and knows and feels that definite measures are being taken for his welfare. The *suggestive* effect of various carefully selected hydriatric measures combined with the actual improvement achieved by means of rest, exercise, work, stimulation and elimination, very soon cause distinct symptoms of improvement even in intractable cases.

A typical case of neurasthenia, such as is found in overtaxed business or professional men, would receive approximately the following instructions:

1. The morning is commenced with an indifferent full bath, 90°–95° F., taken for 15 minutes, with instructions to thor-

oughly *relax* during immersion. This bath is followed by a *cool* shower, 75°–80° F., which is gradually reduced day by day until it is taken cold. If the shower is not attainable the bath is followed by a quick, active ablution with *cool* water, which is also gradually reduced so that at the end of a week's time the temperature of the water registers 60°–65° F. These measures are followed by active friction of the skin with a rough towel and a gradually increased air bath—the patient walking about in a nude state for 2 minutes, and gradually increasing the time to 10 or 15 minutes. The stimulating effect of these measures, especially of the air bath, can only be appreciated by those who have tried and investigated them, and should not be omitted through ignorant scoffing.

2. The breakfast should consist of milk foods, cereals, toasted bread and fruits, and all foods should be slowly masticated.

3. Exercise in the open air, particularly walking (to some definite point and for a definite time), should now be indulged in or the patient will be instructed to perform certain manual work—sawing wood, basket making, hammock making, etc.—depending on individual preference or predilection.

4. After the exercise, 10–11 A. M., a half bath, 90° F., for 5 minutes, with cold affusions to the spine, and treading of water, to be followed by a quick, cold shower and a brisk rubdown. The patient is then directed to rest upon a couch for half hour, and may then indulge in some pastime—reading, etc.

5. The main meal should be preferably taken at noon, and should consist of bland foods (no spices)—soup, meat, fish, an abundance of green vegetables, and fruit—the diet, of course, being changed or regulated if some organic lesion demands it.

6. Rest—recumbent—is usually advised after the dinner, during which the patient is taught to *relax* and compose himself. This midday siesta should last *one hour*.

7. At 3–4 P. M., the patient *treads* water for 5–10 minutes and takes active exercise for half an hour.

8. Between 4–5 P. M., one or two goblets of milk foods—lactic acid milk, whey, cottage cheese—are taken, also fruit in season.

9. The evening meal should consist of but few light foods—eggs, cold meat with lettuce, milk and toast.

10. Retire to bed at 9 P. M., with application of cold abdominal bandage well covered with flannel. Insist on well-aired and well-ventilated bedroom.

This program will be varied to meet each case precisely as the remedies prescribed will be individualized for each patient's symptoms. Thus, palpitation and tachycardia responds to the cold compress over the precordial area applied during periods of rest.

Various phobias—monophobia, agoraphobia, panto- and pantophobia—are treated with positive suggestions given while in a passive state. Headaches—vertigo, when not due to eye or ear lesions—frequently respond to the treading of water, abdominal bandage and other reflex treatments.

Headaches due to anemia require local cold stimulating processes. Insomnia is also influenced by these measures—the baths, alternating, relaxing and stimulating treatments, or prolonged indifferent nightly baths, restoring normal sleep without the temporary aid of medicines. Sexual hygiene must be frankly and freely discussed and corrected. Impotency treated with electricity or local, cold stimulating processes and genital and pelvic conditions corrected, if possible. Orificial abnormalities must also be looked for.

Improvement must not be expected too soon—in continental sanatoria, a so-called "cure" demands from four to six weeks, with subsequent "after-cure" at some pleasant resort, where the patient may gradually conform to the usual routine of life—eliminating such habits or indulgencies as are distinctly prohibited.

In private practice, when patients cannot take sanitarium or hospital treatment, the course must be modified, retaining as many desirable features as possible and advising electric treatments—static and high-frequency—as indicated.

NEURALGIA

Neuralgia has been described as a condition of the sensory nerves induced through changes in the circulatory portion of said nerves or surrounding tissues, inducing hyperemia or anemia with pain or numbness. Neuritis presents structural inflammatory changes in the nerves themselves. Both conditions have been favorably influenced with hydrotherapeutic applications.

The most frequent neuralgias are those of the fifth nerve, trigeminal, facial, dental (*tic douloureux*), cervico-occipital—cervico-brachial, intercostal, lumbo-abdominal and sciatic. The latter is frequently secondary to lumbago and in some cases is a true neuritis.

Causal factors must be looked for in all cases, local circulatory changes, subluxations, pressure, exostosis, tumors, supernumerary teeth, caries of bone, gouty deposits, periostitis, osteitis, etc. The principle of hydrotherapeutic procedures consists in a restoration of normal circulation—relieving pressure—carrying away deposits (uric acid, sodium urate), and producing increased metabolism throughout the economy with special reference to the painful parts. This is accomplished by various general *heating* procedures followed by stimulating, tonic-cold applications.

Thus a trigeminal neuralgia would receive a *daily hot-air bath*, or Russian bath, followed by a cold shower or ablution; in addition, the painful parts would be treated with hot fomentations, electric light lamp, or hot flannel cloths for 5–10 minutes, followed by ablutions of cold water with gentle friction of the parts. The local treatments will be kept up for *an hour* at a time, and repeated during the day as often as the judgment of the physician will dictate.

On similar principles *prosopalgia* has been treated with hot water or hot wine, placed in the mouth, and hot compresses held over the affected nerve.

Brachial, intercostal, lumbo-abdominal and sciatic nerve—pain has been treated successfully with the Scotch douche—the

alternating heat and cold with *regulated impact* being selected for each case. Sciatica usually responds to hot fomentations followed by cold ablutions or affusions. Hot hip or half baths, 110°–115° F., for half an hour or longer, followed by the cold shower or a cold rubdown, are also efficient. The treatment must be continued for some time even if improvement follows promptly, for recurrences are very frequent, and the affected parts require lengthy treatments to assume normal function.

Annequit (*Dauphine-Medical*, Aug., '07) advocates the use of very hot water introduced into the intestine—enteroclysis—for sciatica. He states that the heat acts directly upon the branches of the sciatic nerve and of the sympathetic plexus as well as upon the pelvic ganglia. In addition to their effect upon the nerves, the irrigations improve the digestive functions and eliminate toxins. He recommends irrigations with water at 120° F., which should be gradually increased to 130° F. The patient tolerates these well if the fluid is introduced very slowly and the irrigations are suspended when spasm occurs. The receptacle should not be elevated more than 12–16 inches, and should be wrapped up in wool so as not to lose its heat too rapidly. A flexible rectal catheter is used. He prefers physiological salt solution, which latter is introduced subsequent to a preliminary enema to clear the lower bowel. The patient should lie on the affected side with knees flexed, and should later turn upon his back to avoid cramps and in order to retain the fluid as long as possible. The treatment may be continued indefinitely without bad results—the time being regulated by the vitality of the patient. Repetition, as in the *Wernitz* colon irrigation, depends upon the reaction. The writer has usually prescribed the hot enteroclysis to be taken during the hot hip or half bath—twice or three times daily.

Coccygodynia, when not due to subluxation, osteoma or other abnormalities responds to alternating very hot fomentations and cold compresses repeated frequently, and treatment continued for several weeks.

NEURITIS

The structural changes in the nerves found in neuritis require constitutional medical treatment (syphilis, gonorrhea, toxemia, carbonacidemia, nephritis), and hydrotherapeutically we can assist these measures by means of eliminating and stimulating procedures. Besides these the analgesic effect of excessive heat or cold will be invoked when required.

It is customary to start this class of cases cautiously. Thus, several hot sponges or hot sectional ablutions are prescribed for the first few days with local cold compresses—the latter renewed every 30 minutes. In some cases hot fomentations are found more grateful, but cold should be preferred, and heat substituted when cold is by experience found detrimental. Thus, an exudate in the neurilemma may be temporarily increased by cold and cause increased pain—heat, on the other hand, will produce absorption and tend to diminish the exudate and the resulting pain. The daily hot sponges and ablutions can, in the course of a few weeks, be followed by hot, moist packs given every other day, and a daily hot intestinal irrigation will also be added. All these hot procedures must be followed by *short*, cold applications (ablutions, sponges or showers). The treatment of neuritis requires time, and when inaugurating these measures the physician will protect his reputation by insisting on close obedience to the treatment and continuance of same *for many months* before promising any results.

MULTIPLE NEURITIS

(POLYNEURITIS, PERIPHERAL NEURITIS, PSEUDO-TABES,
ALCOHOLIC PARALYSIS, BERI-BERI, DEGENERATIVE
NEURITIS)

The importance of an early diagnosis of multiple neuritis cannot be too strongly emphasized as hygienic, medical and physical treatments are most successful when cases are seen in early stages.

The same measures advocated for simple neuritis are indicated in this disease with the exception that the eliminative hot pro-

cedures are started vigorously *at once*—prolonged hot baths, one to three hours, having proven of remarkable benefit. The eliminating hot-air baths—repeated twice daily—and followed by cool showers or ablutions, are also efficacious—these vigorous measures must be interspersed with *abundant rest* and local treatments can be instituted for special nerve lesions—alternating hot and cold applications or galvanism, or both, depending on results.

TRAUMATIC NEUROSES

(RAILWAY SPINE—RAILWAY BACK—TRAUMATIC NEURASTHENIA)

The varied symptoms of nerve exhaustion and nerve pain indicated by above terms respond generally to the principles outlined in the treatment of neurasthenia. There is no question but that mental impressions of the injury—the pendency of lawsuits and the solicitude of relatives, have a deterring effect on all treatments attempted in this affection. The treatment given for neurasthenia will be modified so as to include *revulsive* treatments to the spine, such as *gradually, slowly*, increased impact by means of the cold needle or fan douche or affusions of cold water, which will be given after the milder reflex treatments—cool half bath—alternating warm bath and cold ablution or cool shower. Some absorbing occupation or amusement must be found for the patient so as to prevent retro- and introspection and positive suggestions given on all occasions.

Removal from the care of relatives and friends to a sanitarium or good home or hotel, where some of the hydropathic measures can be indulged in, is frequently followed by rapid improvement. If the mental stress incident to a pending lawsuit is removed, the improvement will, in many cases, be a most rapid one. This may appear like impugning the patient's veracity as to symptoms, but it has nevertheless proven true in honorable patients whose mental processes could not be influenced by mercenary motives.

CHOREA

(ST. VITUS DANCE)

Hydrotherapy is employed in chorea in the form of relaxing prolonged daily warm baths, 95°-98° F., of one hour's duration, followed by cold affusions to the spine and active cold ablutions all over the body. The writer has also added general galvanism, carefully going over all the spinal segments with the negative labile pole, 5-10 M. A., for 20 minutes daily. The galvanism is given in the afternoon, the warm bath in the morning. Bland, liquid diet and rest in a darkened room with prohibition of visitors is also advocated.

HYSTERIA

Hysteria requires similar treatment to neurasthenia with a large admixture of suggestive therapeutics on the part of the physician. Causal factors must be carefully searched for and pelvic and genital defects ameliorated. Relaxing procedures followed by *mild* stimulating procedures—no shock being permitted—are frequently successful in restoring the equilibrium of the nerves.

Vibratory treatment has also many advocates. Vibration and massage can be readily combined with the prescribed hygienic and hygienic measures, being gauged in intensity and character by the individual reaction.

LOCOMOTOR ATAXIA

(TABES DORSALIS)

Hydrotherapy has been of but little service in locomotor ataxia, as the tabetic patient is very susceptible to changes of temperature of any kind. Indifferent baths of short duration, 92°-95° F., followed by a cool sponge, assist elimination and stimulate the nervous tone, but have no effect on the lesion itself. The results following static electricity in cases not too far advanced, warrant the most positive endorsement of this treatment in place of all others.

CHAPTER XXXVI

MENTAL DISEASES

Within recent years, hydrotherapy has been enthusiastically adopted by physicians having charge of the insane. The percentage of cures achieved in mental diseases with usual methods certainly warrant the statement that with the addition of hydrotherapy this percentage can be materially increased.

Bearing in mind the sedative, relaxing effect of warm procedures, the eliminating effect of hot procedures, the tonic and stimulating effect of *cold* applications of short duration and the demonstrated effects on metabolism and the circulatory fluids, as well as on the viscera, no scintilla of doubt should exist as to the pre-eminence of hydrotherapy in this class of diseases in which so many symptoms come within its sphere.

In *melancholia* the value of daily indifferent full baths, 92° to 98° F., for 15 minutes, followed by active cold ablutions, or of tepid sponges followed by cold sponges, open air exercise in the company of a good nurse, abundant rest—sleep being induced by prolonged warm full baths taken before retiring, are measures of recognized value.

In *mania*, the patient is strapped in a hammock (Fig. 39) and suspended in a full bath with water kept at a temperature of 95° to 98° F., for many hours and days, if necessary. After a period, the sedative effect of the prolonged immersion will be established and the patient will, after careful repetition, show improvement in many cases.

In *Paranoia* the regular routine of a hydrotherapeutic course will be beneficial, stimulate function and retard the progress of the lesion.

Psychasthenia responds to rest and carefully selected mild stimulating procedures. Starting with daily cold or cool ablu-

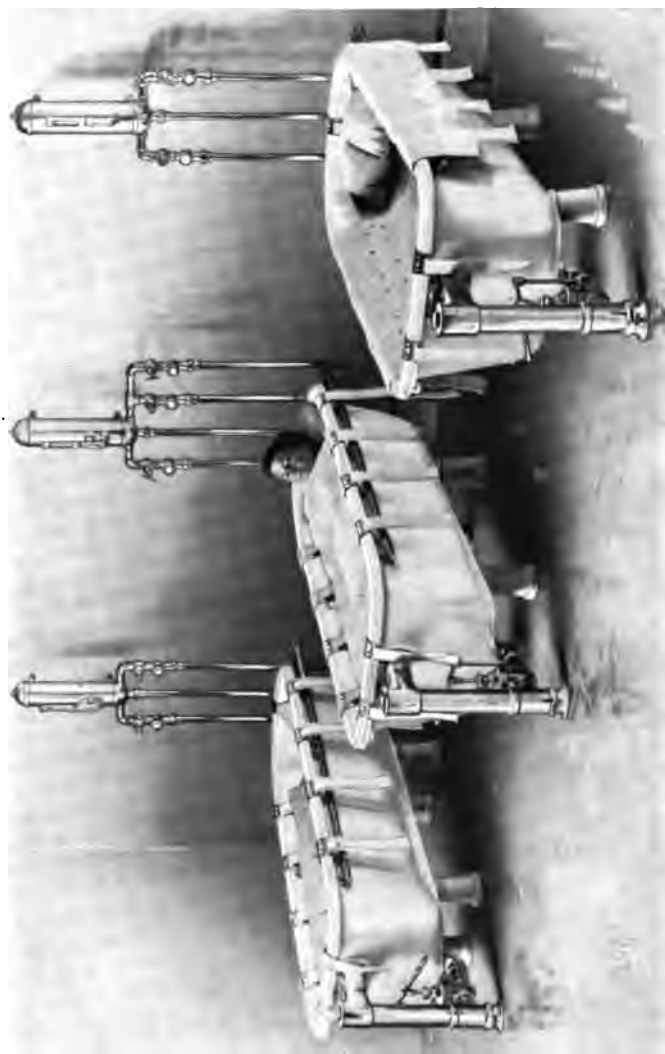


Fig. 39. The Continuous or Hammock Bath.

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tions, subsequent to a warming process, we gradually add the warm shower, which is followed at once by the *cool* shower, the temperature of the latter being reduced to 65° F., after some weeks' treatment, if reaction is satisfactory.

The various symptoms occurring within the realm of insanity—restlessness, insomnia, constipation, anemia, etc.—are treated symptomatically as briefly indicated in the foregoing pages.

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